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The Outlook

The St. Nazaire Raid

QUITE apart from the damage done to the important dry dock and to the submarine basin at St. Nazaire, it is always encouraging to read of operations carried out by the three Services in collaboration, and to see the communiqués issued from Combined Headquarters. The more completely the Services learn to work together the better. These raids in which Navy, Army and Air Force all take part in unison, and under the orders of a combined Headquarters, are a sort of parallel to the appointments of supreme Commanders in the Pacific zone of war. Both steps point the way to ultimate victory, for decisive success will be gained by co-operation of all Forces, not by any one magic weapon. These raids are practice, which proverbially makes for perfection.

In the St. Nazaire raid the part played by the Air Force was rather smaller than usual, as low clouds partially upset the programme of making a diversion by bombing and so distracting the enemy's attention from the crucial point. We could not run the risk of killing French civilians. We also have to deplore a tragic little incident as our ships were returning from the raid. Two Heinkel seaplanes and three or more Junkers 88s shadowed the British ships, dodging in and out of the clouds as they realised that a Beaufighter was on guard. At last the Beaufighter got to grips with one Junkers and shot it down, but the bomber as it fell fouled the wing tip of the fighter, and both plunged together into the sea.

It is distressing to read of such incidents, and yet this one was really less of a loss than the necessary leaving behind of some of the Commando men who could not be embarked, and of some boats with men on board which came under hot fire from the enemy and could not escape. One has to find comfort in the old military adage that one cannot make an omelet without breaking eggs. The damage done to the enemy justified the sacrifice of British lives. The soldiers and airmen gave their lives in a good cause.

Ground-strafers

REPORTS that Bell Airacobras are now ready for operational flying on the Russian front give rise to speculations as to the manner in which the Russian Air Force proposes to use this interesting American fighter. It will be remembered that the original Airacobra had an armament comprising seven guns: a 37 mm. cannon firing through the airscrew hub, two 0.50 machine guns in the fuselage, and two 0.30 machine guns in each wing. It was the United States Army Air Corps which was responsible for the Airacobra being produced, and the fact that the Allison engine was supercharged to medium height only justifies the assumption that the Airacobra was originally intended for work against ground targets.

When Great Britain received deliveries of Airacobras, the 37 mm. shell gun was replaced by a 20 mm. gun, the reason presumably being that the number of rounds which could be carried was limited (30 being the original figure). If, indeed, we are right in thinking that our Russian allies will use the Airacobra against ground targets, it is logical to suppose that they have chosen the original American version 37 mm. gun. It will fire

at the rate of 120 shells per minute, although the relatively small number of rounds that can be carried (the projectile alone weighs 1¼ lb.) will obviously make short bursts advisable.

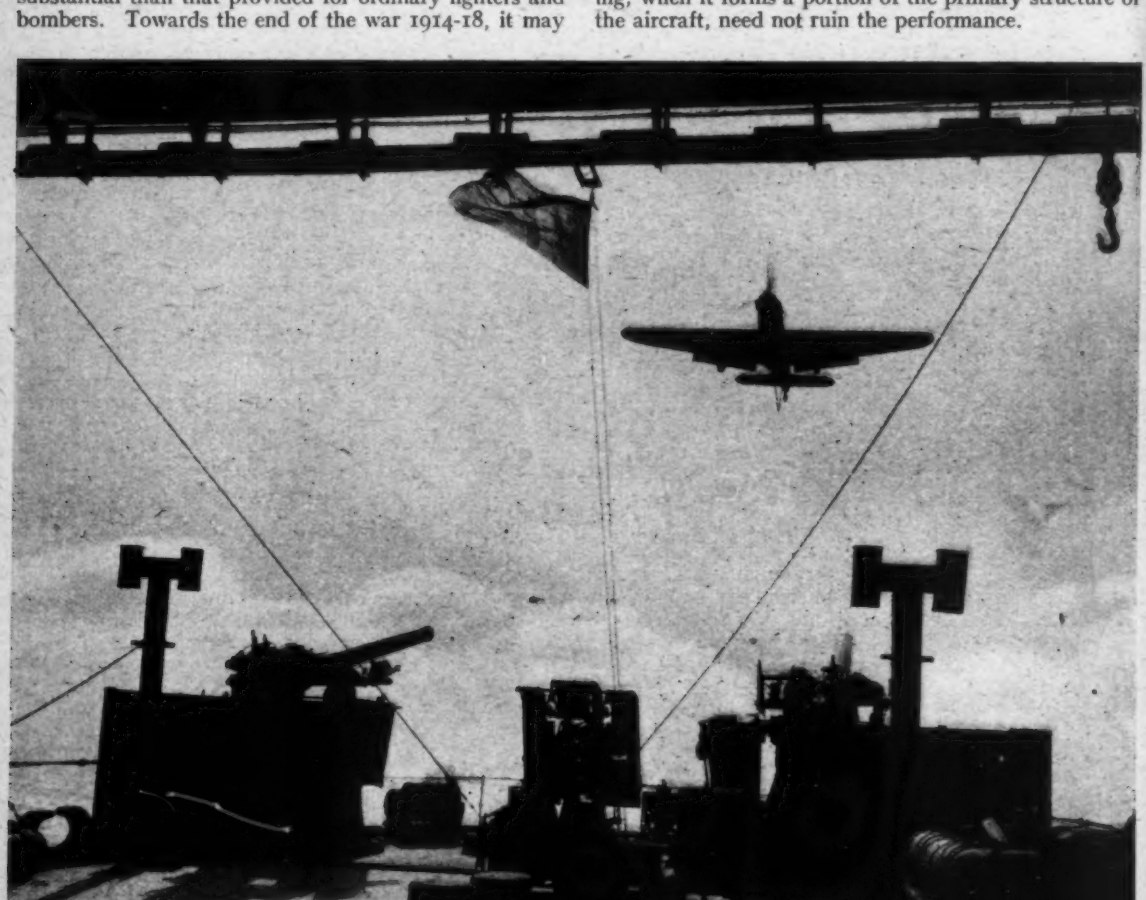
In Libya the R.A.F. has not, so far as official reports have disclosed, had available anything larger than 20 mm. shell guns, with which they have done excellent work against the smaller German tanks and armoured cars, but the heavy Mark 4 tanks seem to have had too tough a hide for the 20 mm. guns to penetrate. A larger cannon fighter would doubtless have been welcome.

Armour Protection

THAT a specialised aircraft for use against ground targets will have to be produced seems obvious. If guns of larger calibre are to be fitted, the firing through the airscrew hub of the normal engine-in-the-nose arrangement is ruled out, and either we shall have to adopt the Bell arrangement of a single engine behind the pilot, driving an airscrew extension shaft, or else we shall have to use two engines.

It will obviously not be possible to protect the crew and all the vital parts of the aircraft and engine against heavy anti-aircraft fire from the ground, but it does appear that the armour protection will need to be more substantial than that provided for ordinary fighters and bombers. Towards the end of the war 1914-18, it may be recollected, there arose a need for low-flying aircraft to be used against troops in the trenches. The Sopwith company produced the Salamander biplane, which was very heavily armoured indeed. The type arrived too late to come into extensive use, but we might learn something from it by remembering that the armour plating was not just a few panels hung on as an afterthought. It formed a complete box, and was the primary structure of the front portion of the fuselage. That system would be more difficult to work into a modern design (the old-time fuselages were slab-sided), but seems worth reviving.

In this connection it is not uninteresting to examine the "price" paid for the armouring. The Salamander was almost identical with the earlier Snipe fighter; both had the same 230 h.p. B.R.2 Bentley rotary engine, and the wing areas were the same, 272 sq. ft. The empty weight of the Snipe was 1,310 lb; that of the Salamander 1,844 lb. The loaded weights were 2,020 lb. and 2,510 lb. respectively, which represented an increase in wing loading from 7.5 lb./sq. ft. to 9.4 lb./sq. ft., and in power loading from 8.86 lb./h.p. to 11.0 lb./h.p. The speed at 10,000ft. dropped from 121 m.p.h. to 117 m.p.h. It might be pointed out that the Snipe had rounded fuselage sides, while the armour-plate fuselage box was flat-sided; this may have reduced the speed slightly. These figures appear to indicate that fairly substantial armouring, when it forms a portion of the primary structure of the aircraft, need not ruin the performance.



SCENE FROM THE QUARTERDECK: A Fairey Fulmar, with flaps and wheels down, about to land on an aircraft carrier. The aft end of the flight deck "round down" appears at the top of the picture.

War in the Air

The docks at Le Havre during a daylight bombing attack. Note the ship at the top which is lying on its side.

Photographic Reconnaissance Furnishes Proof of Damage Done by R.A.F. : Reports of Japanese Use of Gas : St. Nazaire a 1942 Zeebrugge

IT is often the case that the R.A.F. does not know the actual damage it has done in a raid till a considerable time afterwards. Photographs taken by day have now told much, though probably not all, of the story of the destruction wrought in Cologne by the R.A.F. raid on the night of March 13-14. In the Nippes district a large bomb fell on a railway yard, and the damage covers an area of 75,000 square yards previously covered by workshops. To the east of this railway yard an even heavier bomb completely removed all buildings over an area of 6,000 square yards. The Franz Clouth rubber works was an enormous place, spread over 168,000 square yards, and there motor tyres and other rubber articles were made. A large part of these works was razed to the ground, while fire gutted other buildings. That may cause serious inconvenience to German war transport. There are many other areas of major damage, and yet the photographs cannot tell the whole story. Evidently this was the most destructive raid which Cologne has ever endured, though it was by no means the first.

Another very destructive raid was that on Lübeck in the last week of March. The place is a port on the Baltic where submarines and surface ships are built, and it is used for despatching supplies to Norway, Finland, and the northern Russian front. Of course it is frozen-in in winter, and probably numbers of ships and stores had been accumulated there ready for despatch as soon as the ice should melt. The R.A.F. attacked just before this happened, when the maximum amount of material was probably there. The night photographs taken during the raid show that immense damage was done, and doubtless more details will be made known later. Very large fires were started by the bombs, and they spread rapidly. The fire brigades were probably hampered by finding much of their water supply frozen.

On this raid one Wellington crew had a hard tussle to put out a fire when a flare in the machine caught alight. For a quarter of an hour the danger was great, but the second pilot

RIDDLE OF THE RUHR: A Manchester fuselage which received most of the contents of an A.A. shell over the Ruhr.

WAR IN THE AIR

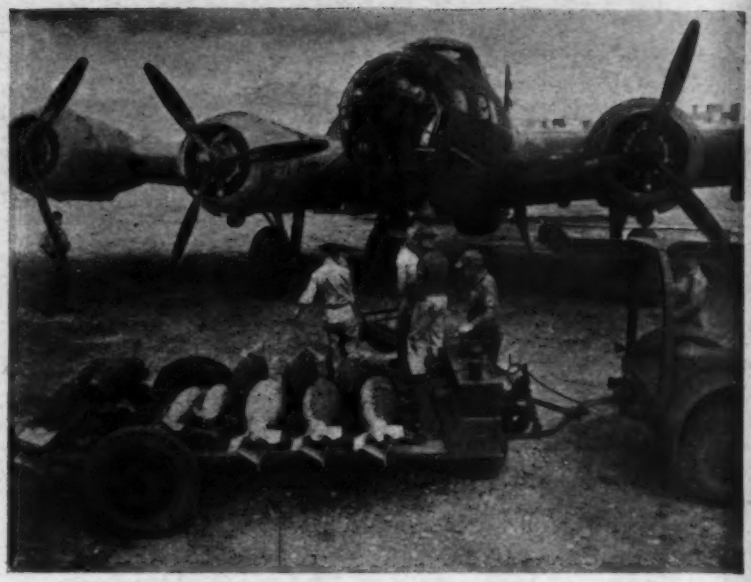
and rear gunner finally succeeded in getting the better of the flames after a very critical time. Both men showed great pluck, and one hopes that neither was badly burnt.

During recent moonlight nights Fighter Command has intensified its activities over that part of Northern France which is within its range. The enemy's airfields are regularly attacked, and often an enemy bomber is surprised, either setting out to bomb some place in Britain or coming back from a raid.

Day sweeps by Fighter Command continue as a matter of course, and of late many Focke-Wulf 190 fighters have been encountered. One of our squadrons recently saw at least 30 of these machines, Germany's latest type of fighter. Our Spitfires in particular have no great respect for the F.W. 190, and have already shot down a substantial number of them.

The Germans have not entirely given up night raids on Britain, though London has had a long period of quiet. On many nights a few individual bombers cross the coast and drop bombs, mainly in East Anglia, but often on other places near the coast. More often than not these bombs fall in open country and do no harm at all, but occasionally houses are destroyed and some people are killed and injured. Sometimes our fighters catch these marauders and exact the due penalty.

The Pacific and Burma remain a critical centre, and there is a grim message from Chungking asserting that the Japanese in Burma have been using poison gas in their attacks on the Chinese forces at Toungoo. So far neither Germany nor Italy has used poison gas during this war, and it was not used in the Spanish civil war. It will be remembered that the Italians disgraced themselves by using it in their conquest of Abyssinia. Whether the Japanese have used it during their four years of fighting in China we cannot say. When used against a nation with developed chemical resources, gas is a double-edged weapon, and the Germans lost far more than they gained by introducing it on the Western Front in 1915.



American armourers loading 300lb. bombs on to a Boeing Fortress.

A message from Canberra says that in the last week of March the Japanese lost more than 50 aircraft. It has also been stated that on and since March 10th Australian and American air attacks had probably crippled over 10 per cent. of the total cruiser strength with which Japan entered the war. That will tell when the United Nations begin to assert themselves once more in Pacific waters.

The last ten days of March saw yet another concentrated attempt by the Axis to subdue Malta. Evidently the Germans do not consider an attempt at invasion of the island on the lines

THE DAY AFTER: A photograph of the docks at St. Nazaire taken by the R.A.F. on the morning after the combined raid. (1) The outer lock gate is missing. (2) The dock pump-house is severely damaged. (3) The machine-house for operating the outer lock gate appears to be damaged. (4) Two small sheds of the pump-house have been completely destroyed—supporting the evidence that the damage to the dock pump-house was severe. (5) A large part of the five-bay building west of the hydraulic machine shop has been destroyed. The roof is missing. (6) Slight damage appears to have been done to the submarine pens under construction. (7) The south end of a multi-bay building is damaged.

WAR IN THE AIR

ENEMY AIR LOSSES TO MARCH 29th.

	Over G.B.	Over Continent	Middle East
March 22	0	0	0
" 23	2	1	5
" 24	0	2	5
" 25	0	2	0
" 26	1	10	15
" 27	0	1	1
" 28	0	16	2
	3	32	28

Totals: North, 5,719; Middle East, over 3,600; Far East (unofficial) 371.

of the Cretan adventure to be at all feasible. The one attack by sea, when a number of E-boats tried their hand at damaging the Grand Harbour, ended in fiasco. We cannot expect that we never lose any aircraft grounded on their airfields in the island, but those airfields continue to work, and Malta is using its central position in the Mediterranean to make itself a positive thorn in the side of the Axis. So the *Luftwaffe*, with a certain amount of help from the *Regia Aeronautica*, has attempted to batter Malta to pieces. The cheerful little city of Valetta must have suffered grievous damage, and the lives of the inhabitants cannot be pleasant, although the shelters in the rocks afford them good protection. But we in London know how disturbing life in shelters can be.

In the last ten days of March there was a practically continuous stream of raiders by day and night over the island, and the Hurricanes, Spitfires, and the very competent A.A. gunners were in almost constant action. Then the attack died down. In the battle the Axis lost quite 117 aircraft, definitely destroyed, probably destroyed, or damaged. Even though Wings and Groups have been withdrawn from Russia to the Mediterranean for the winter, losses on that scale must tell. With the approach of spring the Germans will almost certainly make another attempt to overwhelm the Russian armies, and that will call for all the strength of the *Luftwaffe*. Things should be easier for Malta in the future. The Governor, Sir William Dobbie, has summed things up in the words "We have been through the fire and we find that we can take it."

BRITISH AIR LOSSES TO MARCH 28th.

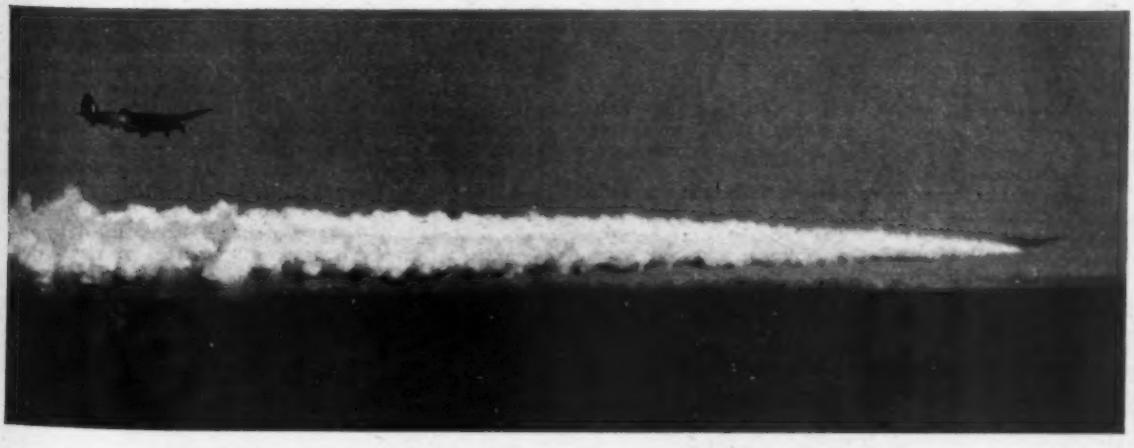
	Over G.B. A'crft.	Over Continent B'brs.	Over Continent Ftrs.	Middle East A'crft.
Mar. 22	0	0	0	1
" 23	0	0	0	3
" 24	0	0	7	0
" 25	0	11	1	0
" 26	0	14	2	2
" 27	0	4	1	2
" 28	0	14	5	4
	0	43	16	12

Totals: North, 3,387; Middle East, about 1,033; Far East (unofficial), 43.

NORTHERN IRELAND A.A.: A battery of 40 mm. Bofors guns practising with live shell. In the foreground is a spare barrel and the special ring spanner for fitting it.

It has emerged that the Japanese in Burma now hold definite superiority in the air. Though the airmen of the United Nations gave the enemy many hard knocks in the air, the latter can replace losses, which it is not easy for the Allies to do. The latter have lost many machines on the ground, because no system of warning when attacks on airfields were coming could be established.

A more cheering item of news comes from Washington, where it has been officially stated that American naval and air forces have so far destroyed 25 Axis submarines. No doubt Nippon had built up a numerous fleet of these craft before entering the war, but the loss of 25 boats must have a serious effect on any such fleet, and this destruction has taken place in a very short space of time.



THE FOGGIEST NOTION: Blenheims laying down a smoke screen at a military demonstration of combined operation by aircraft, tanks, paratroops and gliders.

Second Article of the Series

THE FUTURE OF CIVIL AVIATION

International Co-operation : A "Clearing House" Desirable : Internal Services : The Question of Efficiency : Clubs and Private Flying

By "PLANTHAIR"

IF, as we hope, Parliament sets up a Royal Commission or some authoritative independent committee to consider post-war civil aviation, it might well be that this body would decide that, as a general policy, the broad lines of pre-war development should be continued so that this country would take its proper place in international aviation.

At one time, some thought that there was a possibility that British aviation would lead the world in the same way as British shipping did. The politicians never made any attempt to give it the opportunity even if it could, but now we hope that the world is not thinking in terms of expansion by one nation at the expense of others, but rather that all should contribute in proportion to their wealth and ability with the object that the maximum benefits of aviation may be available for the greatest good of the greatest number.

The logical outcome of this kind of premise is the complete internationalisation of civil aviation. Whether this is desirable or even possible is a matter for discussion, but I think there are grave objections to trying to bring it about in the immediate post-war future. Like other forms of international collaboration, it would only be successful if all nations were persuaded to sink their individual interests.

It would, perhaps, be more practical to look forward to a world in which there were no economic barriers, but where national cultures still flourish. Unfortunately, it is very difficult to draw the line between a nation's cultural and economic aspirations.

In the meantime, it would be safer to assume that the part which this country would take would be particularly concerned with the continuation of the development of the Empire air routes in association with the Dominions and in collaboration with other nations, and that internal aviation should be encouraged in so far as it provides public service.

Subsidiary Matters

Given these assumptions, there are certain subsidiary matters which it is worth while to examine. Suggestions have already been made for the internationalisation of civil aviation and they are attractive, but, as I have said, it seems more likely that each country will wish to develop its own aviation if it is in a position to do so, and if it seems good to it, and its international economic relations require that it should extend its activities to neighbouring countries.

Given a measure of goodwill, there is no reason why this should not be practicable, but it is clearly desirable that there should be some form of clearing house so that unnecessary international competition can be avoided and amicable agreements made as to which countries should run particular services.

I hope that in this country all our activities in connection with civil aviation and other things will be conditioned by the requirements of public service. If the same thought governs the deliberations of an international body, there should be little difficulty. A great deal will depend on the economic relations of various countries, but there is little use discussing the relations between various national civil aviation services if we cannot assume that the post-war world will be a place in which the old cut-throat economic and military policies do not exist.

An international clearing house of this kind would obviously have technical functions as well as political ones and would provide a substitute for the International Commission for Aerial Navigation of other days—framing regulations for international signals, a minimum standard of airworthiness generally acceptable and other matters of a like nature. Incidentally, these technical standards should be defined in as simple terms as possible, leaving each country to add to them as it seemed necessary.

It is within the framework of an international agreement that the British Empire services should be drawn up, and the first essential here is that consultations with the Dominions should be instituted to discover what mutual services are required and in what measure each is willing to contribute to the cost.

I deprecate the suggestion which has been made that we would regard the establishment of an American service across Africa as jumping our claim. These arrangements have been made between the American and British Governments, and it is not to be doubted that the only consideration was the efficient prosecution of the war.

An Untimely Suggestion

The suggestion recently made in the House of Commons that the matter should be regarded in the light of a competitive advantage to an American company is, to say the least of it, untimely. When we come to adjust the relative activities of American and British civil aviation through the international clearing house I have suggested, we can only hope that this attitude of national gain, as opposed to the requirements of international service, will not be in evidence.

It will not be possible to achieve any measure of international agreement before the end of the war, but this need not prevent Britain, either alone or in collaboration with any other country, developing any international services that circumstances may require. It is unlikely that these, established as they would be to meet war conditions, would be the same as would be required in peacetime, but if adjustment were necessary it might present less difficulty than an agreement which started with a practically clean sheet.

The same considerations which apply to international aviation also apply to internal services. Here again the touchstone must be public utility.

I cannot believe that it would be sound to allow anyone who could buy an ex-Service aircraft very cheaply to commence a service which could not hope to survive in times of peace. So far as internal aviation is concerned, we should therefore revive the Licensing Committee with extended powers to decide not only which interval services shall survive, but which should be introduced. There are no doubt places in this country which could be served by air to the great benefit and convenience of those who live there, but for which an air service would be an uneconomic proposition. We must not rely entirely on private enterprise in a case like this, but leave it to the Licensing Committee to decide whether such a service is necessary and, if so, direct that it shall be operated.

This kind of proposal naturally brings up the question of whether internal services should be operated by one "chosen instrument," as were the overseas services before the war, or whether private companies should be allowed to function as they did internally. It also raises, once again, the question whether any national aviation organisation, external or internal, should be sub-divided or allowed to operate as a single company.

The disadvantages of a single subsidised organisation are manifest and are almost as great as unrestricted private enterprise, but there is surely a happy medium which we could adopt and which finds favour with many knowledgeable people.

A large organisation such as British Overseas Airways

is very much inclined to become "a law unto itself," and the public have no yard-stick by which to measure its efficiency. No doubt the people responsible for its administration are in themselves efficient and wish the whole to be likewise, but they must find it difficult to maintain an organisation of the size necessary at the pitch of efficiency it would attain if it were in competition with a similar organisation—competition either in respect of providing services or earning profits.

This difficulty is fundamental because, however good the individuals may be, the whole has not the incentive to efficient operation when the losses are met by the public, and there is very little opportunity for the public to know whether it is getting value for the money spent. Nobody wishes to introduce unlimited competition between subsidised air services, but there is a fairly simple solution which seems to provide the advantages of competition without the disadvantages of monopoly.

Subdivision

There is no reason why overseas and internal services should not be sub-divided. For example, the European, African, Australian and American services of British Overseas Airways might well be operated independently.

Many business firms adopt this method of subdivision in order to achieve the maximum efficiency. A large organisation often consists of smaller complete organisations which, although they do not compete in the provision of services, do compete with one another in efficient standards of operation. Main matters of policy and the purchase of equipment are decided by the parent organisation.

In like manner, British Overseas Airways might well be responsible for large matters of policy and for the buying of aircraft, but hand the machines over to their subsidiary companies to operate. There would no doubt be great differences between the operating conditions of these subsidiaries, but, after the necessary allowances were made, it would be possible to see whether one subsidiary was operating more efficiently than another, and there would be keen competition between them, although they would not be flying against one another on the same service.

This kind of subdivision would make for efficiency in operation and allow those in charge of the subsidiary companies to have a far greater measure of personal responsibility than they would have if they were merely assistants in one large company.

It seems that we should face the organisation of internal airways in the same way. Much as some people would like unlimited licence to buy aircraft, as they hope, at scrap prices after the war and run internal services, this cannot be in the best interests of civil aviation or, in the long run, of the country itself.

I shall deal with the question of the provision of civil aircraft at the end of the war later on, but it seems clear that, if we are to have an ordered system of internal civil aviation, it must be controlled from the beginning, and once again let me emphasise that the only justification for a particular air service must be public utility.

We must also consider the position of the clubs and private flying in this country, and here I think we might make an exception to the general rule and allow the few who will be able to afford it to buy aircraft as and when they can and operate them for their own pleasure.

So far as the clubs are concerned, they should be encouraged to provide flying facilities for the innumerable ex-service men who would like to have them after the war, but who will not otherwise be able to afford to fly.

There is no reason why surplus training aircraft should not be passed over to the clubs free of charge in the hope that, by careful management of their finance, they would be able to replace them when they became obsolete.

AIR and ARMY DISPLAY

Parachute Troops and Gliders in Eastern Command Demonstration

A DISPLAY of how aircraft can be used with our Army and against an enemy army was given the other day in the Eastern Command before some thousands of spectators from all three Services. The new Army Air Corps took part with its gliders, and parachute troops also displayed their abilities. The "enemy" was a series of dummies representing a column of infantry, a troop of field guns, a column of transport, and two old tanks.

Proceedings opened with a survey of the enemy's position by two Tomahawks of a Tactical Reconnaissance squadron, and then six Hurricanes of the twelve-gun variety swooped down on the pretended troops on the march. Naturally these did not disperse and bring their own weapons into action, and so were riddled with thousands of bullets. The Army is now supplied with anti-aircraft weapons, and an Air Force commentator explained that nothing puts a pilot off so much as seeing a stream of tracer bullets coming up at him. The Hurricanes went on to attack the motor transport, and then other Hurricanes of the four-cannon type attacked the guns and the tanks. Bostons followed on with anti-tank bombs.

Converging Attack

While the spectators were examining the targets, a squadron of Spitfires made a dummy converging attack. A fly-past included a Heinkel lll and a Me. 109. Then came the Army Air Corps, their gliders towed by good old Hectors. One of the gliders cast off its tow and landed. The ground was very rough, and it damaged its undercarriage, but the troops poured out of it and dashed to the attack. The G.O.C. of the air-borne division said that gliders cannot be landed at night, even in moonlight, without heavy casualties. The Germans might accept such casualties if they were attempting to invade. He also said that gliders would take enormous punishment before the troops inside were hurt. [One realises, of course, that as they have no engine and carry no petrol they are not easy to shoot down, but a spraying along the fuselage from eight or twelve machine guns would surely have some effect on the troops.—ED.]

The next item was provided by parachute troops of the Army, who dropped from their Whitleys. The G.O.C. told the spectators that in the Bruneval raid only one man sprained his ankle, and that not badly enough to prevent him from fighting and getting down to the beaches. There are fewer injuries by night, he said, because men drop more limply in the dark. In a daylight operation a smoke screen would be laid before the Whitleys appeared and the men would drop into it, but for this display the Blenheims which laid it came on the scene after the men were safely on the ground. Other Blenheims fitted with sirens then did a dummy converging attack.

There was no display of dive-bombers, but it is doubtful if they could give a convincing exhibition of their powers and limitations in a sham fight. A large proportion of their effect is moral, and if the dummy enemy can neither bolt for cover nor fire calmly at them with machine guns, it would not be easy to judge their worth. But it is to be hoped that the Army gained a better idea than it has had before of the extent to which the air can help it, and of the limitations suffered by such enemy aircraft as it may find in opposition to it. The Home Guard was represented among the spectators, and it is especially important that its leaders should have a clear idea of what to expect in case Hitler attempts an invasion. The other troops may have an opportunity of seeing aircraft in real action.

D

BARS, STARS and STRIPES

Insignia of Rank in the U.S. Army Air Forces

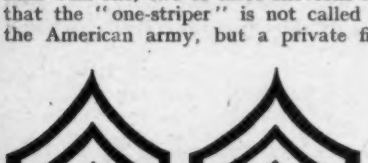
NOW that American troops are arriving in the British Isles, many of us will probably be encountering fighting men whose chevrons and other insignia of rank are strange to us. When one realises that this entails the risk of greeting a "top sergeant" as "Corporal" or, worse still, slapping the small of the butt to a general instead of presenting arms, it is clear that something ought to be done to minimise the likelihood of such embarrassing calamities.

On this page, therefore, we illustrate the various marks of rank as worn by members of the United States Army Air Forces in the hope that no reader of *Flight*, at any rate,

American chevrons are worn point upwards and are curved. These three signify the private first class, corporal and "buck" sergeant respectively.

will unwittingly disrate an American non com. or underestimate the standing of one of their officers.

Most of us are already aware, no doubt, that American N.C.O.'s wear their stripes upside down—we've gathered that much from the movies—though we are prepared to accept (with the courtesy due from host to visitor) their view that it is we who wear our chevrons inverted. That being so we should be safe enough when encountering the man with one, two or three chevrons on his sleeve, except that the "one-striper" is not called a lance-corporal in the American army, but a private first class, or, more briefly, a "P.F.C."



(Left) Staff sergeant; (Right) Technical sergeant.

Two stripes, as in the British forces, denotes a corporal, but the man with three stripes is known to the Yankees as a "buck" sergeant; it will be quite safe, however, not to pass him the "buck," but just call him "sergeant."

After that it begins to get more complicated; they start adding loops under the stripes, which, by the way, you will notice from the accompanying illustrations are curved, instead of straight like ours.

Three stripes with one loop means a staff sergeant, and with two loops, a technical sergeant. Each of these is a specialist in his own line, but that extra loop carries more pay. Three stripes with two loops plus a diamond in the centre denotes a first sergeant (or "top-kick" as they call him) and is probably equivalent to our flight sergeant, while three stripes with three loops is the insignia of a master sergeant and equal to the warrant officer pilot, which is the highest non-commissioned rank in the R.A.F.

Insignia of American commissioned rank are quite different from ours. A single gold bar on the shoulder means a second lieutenant (pronounced "lootenant," which is much nearer the original French). When the bar is silver its wearer is a first lieutenant, which seems rather a curious reversal of natural values. The next rank, that of captain, is denoted by two silver bars. Then comes the gold oak-leaf, indicating a major, followed by the silver oakleaf, which means a lieut.-colonel. The rank of colonel is distinguished by the silver eagle, beyond which begins the point where the uninitiated Briton is most likely to drop his heaviest brick.

For, believe it or not, the single star which means, in the British Army, a humble subaltern, proclaims no less a personage than a brigadier in the American forces! But if you are observant enough to notice that it is a *silver* star, then you won't be likely to blunder. Two silver stars is a major-general, three a lieut.-general, and four a full general.

(Left) First sergeant (known to the ranks as the "top kick"); (Right) The master sergeant.

Actually, America only has two officers who wear four silver stars, namely, Chief of Staff George Marshall and General Douglas McArthur.

(Left) One bar on the shoulder; if gold the wearer is a second lieut., if silver he is a first lieut. (Centre) Two silver bars denotes a captain. (Right) A gold oak leaf means a major, but a silver one means lieut.-colonel.

The silver eagle signifies the rank of colonel, but the silver star is the insignia of a general, from one for a brigadier to four for a full general.

Don't Shoot Pigeons

A NEW Order in Council made under the Defence Regulations tightens up the procedure for dealing with people who shoot homing pigeons engaged on vital war work.

Homing pigeons are extensively used by the fighting services for carrying urgent messages when other means of communication are impracticable, and readers of *Flight* hardly need reminding that the R.A.F. has thousands of pigeons in its vital signal service.

Under the new regulations, the penalties for killing or wounding homing and racing pigeons are unchanged. But the law no longer requires proof that the shooting was done with the knowledge that the bird was a homing pigeon. Offenders must prove they had reasonable belief that it was not.

More important still, they must immediately hand over the bird, and any message or identification, to the nearest police station.

TURKEY'S AIR ARM

Geographical Factors : The Training of Youth : The Development of the Air Arm

By V. L. G.

EVER since Kemal Attaturk started to rebuild a new and vigorous nation on the ruins of the Ottoman Empire aviation was one of his vital concerns. No one realised better than this great statesman and his close collaborators how geographical factors may influence the development of the Turkish State. For stretching along the southern seaboard of the Black Sea towards the Caucasus, in the west across the Balkan Peninsula and bordering in the South on Syria, Turkey is situated on the junction of short routes to the richest oil regions of the Middle East and Russia. Furthermore, the domination of the Dardanelles makes Turkey into the châtelaine of the important thoroughfare from the Black Sea to the Mediterranean and the Suez. With their country in such a key position the leaders of new Turkey spared no efforts to develop their armed forces and to train their men in modern methods of warfare. With the Nazi flood gradually approaching the shores of their country the Turks have intensified their efforts to make any attempt at turning their country into a thoroughfare for the Nazi steam-roller as unattractive as possible. In this preparedness of the Turkish nation the Air Arm is playing a considerable role.

The Training of Youth

It is obvious that with the tremendous tasks of economic and social rehabilitation heavily draining Turkey's material resources, the development of the Air Arm could not proceed at a pace desired by the Turkish authorities. These economic impediments were, however, to a considerable extent compensated by the correct appreciation of the air factor in the defence of the country. In their unceasing efforts to develop a nation-wide air consciousness, the Government could count on the enthusiastic support of the Turkish people.

The framework of this national endeavour to train young Turkey in the different branches of flying and keen activities is the Turk Hava Kurumu, the Air League which is maintained by voluntary contributions of the public and subsidised and controlled by the Government. This society controls the Turk-Kushu (Turkish Birds Society), which operates schools all over the Republic and instructs in glid-

TURKEY'S FUTURE : General Fevzi Cakmak inspecting young cadets of the Turkish Air Force. These young men may yet play an important rôle in the defence of their country.

TURKEY'S

SYMBOLS OF FRIENDSHIP: British Blenheims in service with the Turkish Air Force.

ing, parachute jumping and flying. Practically each Turk-Kushu centre has a parachute jumping tower. Initiated at first on these towers, the pupils subsequently finish their training from flying aircraft; since both gliding and parachuting involve relatively moderate public expenditure, they are widely catered for and the Turkish youths take good advantage of the facilities so offered.

In the schools maintained by the Society, training is absolutely free of charge. The only limitation on the eagerness of the young people to join is a careful selection of applicants for their suitability and their physical and educational standards. It is only logical that with the general emancipation of the Turkish woman, the facilities for flying, as offered by the Turk-Kushu Society, are unreservedly open to her. Indeed, the metamorphosis has for long been completed; the veil and the seclusion of feminine life has given way to the flying kit and the bracing air of the airfields.

The Air Arm

The structural organisation of the Air Arm is based on the brigade, and similar to other Continental countries it is under the unified command of the armed forces.

Since military service is compulsory, the Turkish Air Force can draw on the annual intake of recruits to cover its requirements in unskilled personnel. For the skilled trades volunteers are selected very carefully, and skilled or semi-skilled mechanics and tradesmen are particularly welcomed. Enlistment is based on an agreement to serve for a period of years, followed by another period on the reserve. Upon entry, volunteers are sent to the Air Force training centres where they receive thorough instruction in their respective branch of trade and pass out as N.C.O.s.

Pilots of the Turkish Air Force are usually commissioned officers recruited exclusively from volunteers who are bent on making the Air Force their permanent career. These young men are given a very comprehensive and thorough training. Turkish military leaders certainly appreciate the value of close collaboration of all branches of their armed forces. They do not believe in the superiority of one particular service, and they reject the idea of an independent policy of each arm. This conception of warfare is in practice applied to the training of the budding officer. On being accepted as a candidate he is sent to the Harbije Mekteb (the War College), where for a period of about two years he receives a general military training. In the classroom he studies together with the future infantry, artillery or sapper officers, and is gradually introduced into the theoretical side of flying, which enables him to comprehend better the practical training yet to come.

The Harbije Mekteb does not claim to turn him out a finished product for the Air Force; here he has to become intimately conversant with the various aspects of fighting and the various problems of operations of the armed forces.

There is no doubt that this method of training is most likely to succeed in producing a type of Air Force Officer who understands the value of co-operation with the ground forces and to whom the activities on the ground are not a strange mystery. The joint initial training of all officers of Turkey's Armed Forces helps also to create a better understanding in their future lives when their careers radiate into the different branches of the Service.

From the War College the Air Force Cadet passes on to the Air Force Training School, where he receives a methodical training in flying, combat navigation modelled after the R.A.F. system. Upon completion of this course he is posted to a unit with the rank of Second Lieutenant.

While the training of the Turkish Air Forces is thus well planned and efficient, the inadequate production basis for their equipment is the Achilles heel in Turkey's armour. The economic and political organisation of the Ottoman Empire relied upon the importation of finished industrial products and left the development of local industry completely dormant. The existing modest mechanical industry has been created by the Government only during the last twenty years. But since this period coincides with

READY FOR AB INITIO: Young cadets line up for inspection upon arrival at an Air Force Training Centre.

R ARM

the strenuous efforts of the Turkish nation to rebuild their battle-shattered country, the concomitant reduction of economic standards did not permit the development of a motor and mechanical industry. Lacking this base of technical experience and of economic resources the aircraft industry could not develop and the Turkish Air Force had to depend on the importation of foreign aircraft and accessories. Since political factors always play an important role in such purchases, they must of necessity influence the type and quality of the material imported. The equipment of the Turkish Air Force is therefore composed of a variety of types, ranging from German Buecker trainers and Heinkel bombers to Polish and French types, British Blenheims and American fighters. Such reliance on foreign supplies not only prevents uniformity of spares but becomes particularly hazardous when the supplier is either incapable or unwilling to provide further deliveries. Only quite recently Turkey found herself in this predicament when she could not obtain spare parts for the Heinkel lll bombers purchased from Germany. It is only due to the good relations existing between the Turkish and the British Government and to the good shooting of the R.A.F. that parts of German aircraft shot down over this country and elsewhere have been placed at the disposal of the Turkish Air Force.

Problems of Equipment

In the attempt to solve—if only partially—the problem of equipment the Turkish Government has been very active in organising plants for the manufacture of aircraft parts to foreign designers and the assembly of imported material. As yet one cannot consider these plants as fully equipped production centres. Rather are they industrial nuclei where labour can be trained and skilled man-power employed pending some future expansion. But these Government workshops may yet have an important task to fulfil in an emergency when any domestic industrial resources would be of great value.

That such emergency may well come is ever before the Turkish leaders. While strictly adhering to the status of neutrality, Turkey is not taking any chances and prepares for any developments in the Middle East. The expenditure on the defences has been steadily rising since 1939, and the defence credits for the fiscal year 1941-42 amount to £T.243 Mill., a considerable figure in Turkish economy. But of even greater importance for the strengthening of the Air Arm is the extension of the Lease and Lend Bill to Turkey. This is only a logical development of the Anglo-French undertaking given to Turkey in October, 1939, promising to furnish her with all defence material required for the preservation of her independence. At this juncture when other suppliers are not available, and when the strength of her Air Arm may be of vital importance to the very existence of the Turkish State, the Allied supply of modern fighters and bombers is of particular significance.

Turkey's Pre-war Strength

Before the beginning of this war, the aircraft at the disposal of the Turkish Air Force is said to have numbered some 600 machines. This figure has presumably since increased, and more modern equipment added. While no offensive striking power can, however, be ascribed to the Turkish Air Force, its value is by no means negligible. Clearly, if left unsupported, Turkey's Air Arm could not hold the air space clear of an intruder for any serious period of time. But even if for the purpose of a correct appreciation of Turkey's air potential the assistance by her friends is to be left unconsidered, the role of Turkey's Air Arm in the defence of that country should not be underestimated. Its value will primarily manifest itself in its close co-operation with the ground forces, in acting as a screen for their mobilisation and, possibly, succour. These tasks will be facilitated by the wide net of landing facilities. Indeed, Turkey's airfields are not only the vanguard of the defences of the Northern Sector of the Middle East but are of equal importance to the security of Russia. Their control by the enemy would not only slam Russia's back-door and endanger the rear of the Russian Armies, but threaten to interfere with the vital oil resources of the Caucasus and open the way to Suez. Since their security depends in the first place upon the operational capacity of Turkey's Air Forces, their modernisation and expansion is of foremost urgency. This is not a problem of man-power. The qualities of the Turkish fighting man are well known. But experience of this war has shown that though the man behind the machine is the decisive element, the type of machine he can muster at a critical moment is not of secondary importance. Brave and hard-hitting forces, fighting for their freedom, such as those of Jugoslavia or Greece, have been crushed by a superiority of machines. In the light of this historic experience the provision of adequate modern equipment for Turkey's Air Arm appears even more urgent.

AMAZONS OF THE CRESCENT MOON: Turkish girls have enthusiastically taken to flying and attain high standards of proficiency.

ADVERTISED GOODS

THE fact that goods made of raw materials in short supply owing to war conditions are advertised in this journal should not be taken as an indication that they are necessarily available for export.

HERE AND THERE

Plastic Appointment

DR. K. G. A. COCK, technical manager of M. and B. Plastics, Ltd., has been elected to a seat on the company's board and has been appointed its Technical Director.

U.S. Women Ferry Pilots

JACQUELINE COCHRAN, the American woman pilot who last year flew a bomber part of the way from Canada to this country, is now forwarding a scheme to enlist other American women pilots in the Air Transport Auxiliary.

According to a report from Montreal, an advance batch of 25 recruits had left there after medical inspection, flying tests and refresher courses. They are now in Great Britain.

Miss Cochran, whose married name is Mrs. Floyd B. Odlum, told Canadian Press representatives she expected to enlist at least 375 of her countrywomen for service with the A.T.A. in Great Britain.

Without Comment

WE cull the following from the February 1st issue of *American Aviation*.

"British air cadets who failed to make the grade as pilots in the U.S. complain that American standards of examination are 'far too high' for wartime needs, according to reports from London. More than half the youths sent to the U.S. for pilot training are washed out, it is said.

"The disappointed trainees, some of whom will undergo instruction in England as gunners or observers, explained that the majority were rejected because of 'dangerous flying' or 'mechanical flying.'"

Chinese Woman Flt. Lt.

MISS HANYIN CHENG, attaché of the Chinese consulate in Vancouver, is the only woman in Canada to hold the distinguished aviator's licence of the Federation Aeronautique Internationale of the Royal Aero Club of London. She is also a member of the Aero Club of British Columbia. She learned to fly in Hong Kong from R.A.F. instructors, and Generalissimo Chiang Kai-shek was so impressed with her abilities that he granted her a commission in the Chinese Air Force with the rank of Flight Lieutenant.

Miss Cheng went to Canada in 1940, being appointed by the Chinese Foreign Office to the Chinese-consulate-general in Ottawa, later joining the staff of the consulate in Vancouver as attaché.

Fighter Station Theatre

A FIGHTER Command station in the North-East now has its own theatre and concert party. It has had a warm reception from the airmen in this remote spot.

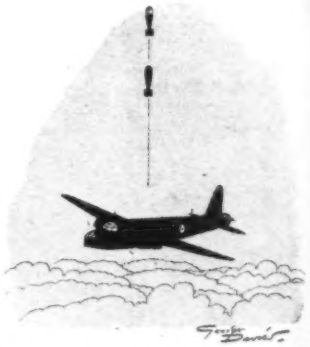
The theatre is part of the N.A.A.F.I. hall and can seat 450. Local war charities gave £400 towards the cost of the stage, equipment and lighting apparatus! but all the work of erecting the stage was done by airmen in their spare time.

A flight sergeant, formerly a commercial artist and now a gunner in a night fighter, designed the stage and carried out the decoration. Another flight sergeant, employed in the station workshops, planned and wired the electrical system. It took him six nights a week for five weeks and he often remained on the job until the early hours.

Aircraft Identification

THE series of *Flight* aircraft identification charts of British and German aircraft, and of American aircraft in use by the Royal Air Force and Fleet Air Arm, many thousands of which have been sold to the Services and public, measure approximately 21½in. by 14½in. on card.

The main illustrations present general views of the aircraft, supported by line drawings depicting side elevation, head-on and plan views, with salient identification characteristics in the adjacent text. They cost 1s. 3d. each net, with postage 6d. extra for single copies, 7d. up to three copies, and 8d. up to six copies.



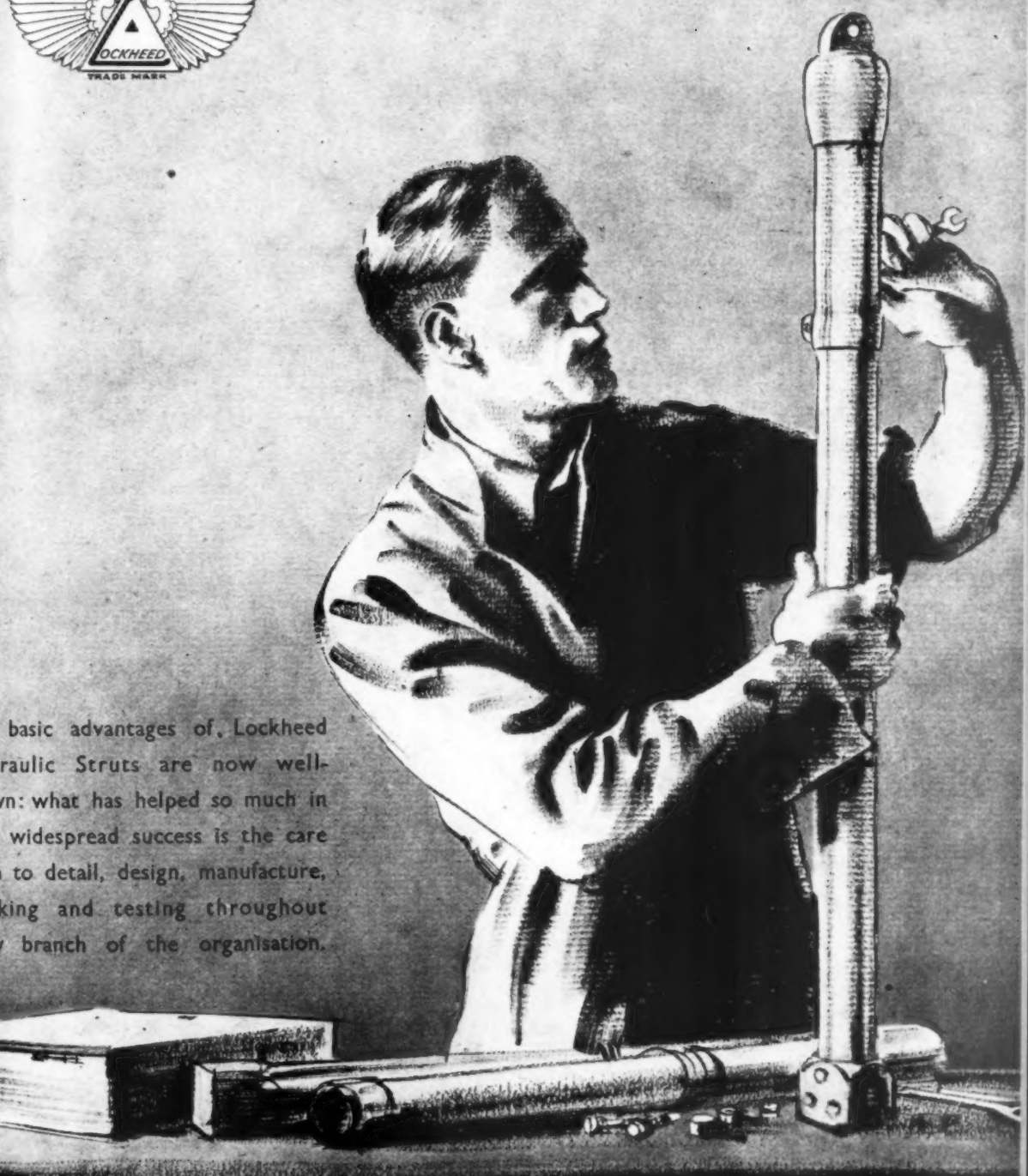
"Hey, skipper, something's wrong!"

Transparent pocket identification charts printed on celluloid of British and German aircraft have also been prepared by *Flight*. They measure approximately 5¾in. by 4¾in. (two sheets eyeletted together), and, like the wall charts, embody a general perspective supported by broadside, head-on, overhead and underside aspects of the leading types with text describing the characteristics. Handy and weatherproof, and invaluable ashore and afloat, these compact pocket charts cost 1s. 6d. each post free for single copies.

An Italian aircraft identification chart is also available on art paper, and comprises 26 illustrations of the leading types. The price is 6d. each, or by post 7½d.

All the charts are available from *Flight* offices, Dorset House, Stamford Street, London, S.E.1, or through newsagents.

SPOTTER'S HEADACHE: Enemy aircraft which have been captured whole—or very nearly so—are now being reconditioned and used for instructional purposes in the United Kingdom. This must complicate the work of the Royal Observer Corps somewhat, but its informative value is beyond question. Here is a Ju 88, with R.A.F. roundels, making amends for its hideous past.



The basic advantages of Lockheed Airdraulic Struts are now well-known: what has helped so much in their widespread success is the care given to detail, design, manufacture, checking and testing throughout every branch of the organisation.

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THE S. E. 4

A Product of the Royal Aircraft Factory : 135 m.p.h. with a Rotary Engine of 140 h.p.

By THE EDITOR

THERE must be many among our younger readers who are unaware that there was a time when the Royal Aircraft Establishment at Farnborough was a Government aircraft "dockyard." Before the war 1914-18 the present research establishment not only designed aircraft, but built considerable numbers for the R.F.C. In those days the title was the Royal Aircraft Factory, the initials of which survived for many years in connection with wing sections, such as the R.A.F.15, which was so popular for biplanes.

The aircraft types produced by Farnborough were known under three general series letters: F.E., B.E., and S.E. The first were supposed to stand for Farman Experimental, the second for Bleriot Experimental, and the third for Scouting Experimental. The F.E.s were pushers, the B.E.s and S.E.s tractors. The Farmans and Bleriots of those days were taken as examples of the pusher and tractor respectively, although cynics had it that the initials B.E. stood for "Bits of Everything."

Farnborough Designers

If I am not mistaken, Major F. M. Green, who afterwards became chief engineer to Armstrong-Whitworths, was in charge of scout design at that time. With him was Mr. H. P. Folland, who later joined the Gloster company as chief designer. They produced the S.E.5 which became famous in the war 1914-18 as a single-seater fighter, but before that type made its appearance they produced several experimental designs, among them the S.E.4 shown in the picture below. I believe Capt. Geoffrey de Havilland also had a hand in the design.

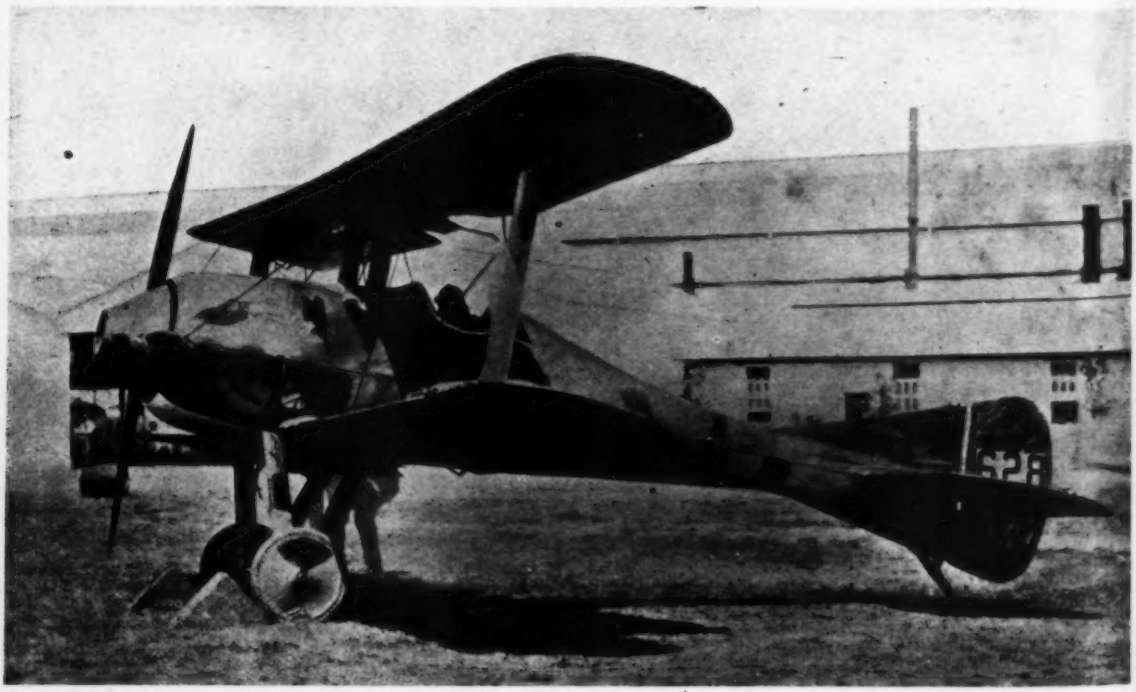
At about the time when the S.E.4 appeared, we were still accustomed to pushers, with their drag-producing tail booms and stilty undercarriages, and even the tractor biplanes were not very "refined." In the S.E.4 a serious attempt was made to reduce drag to an absolute minimum, but the wings were too thin and the fuselage space too small to house the wheels, and so the undercarriage was not retractable. In other respects, however, the machine was certainly "clean." The fuselage was of good form, although "tadpole" rather than streamline. A cockpit cover was designed, but is not in place in the picture.

The engine of the S.E.4 was a double-row 14-cyl. Gnome rotary of 140 h.p., which drove a four-bladed airscrew. As the engine was completely cowled-in, and there was a large spinner over the airscrew boss, cooling presented some difficulty, and a fan had to be incorporated.

It was in the wing structure that the greatest ingenuity was to be found. The biplane wings were of the usual two-spar construction, but in order to reduce drag, single struts were used. These had long "feet" at each end, which picked up on the spars, and the lift and anti-lift wires were crossed over to form a letter X when seeing the machine from the side. Not only the inter-plane struts were single I struts, but those of the centre section as well. Trailing-edge flaps were used both as ailerons and as lift-changing devices. They made a difference of about 5 m.p.h. The S.E.4 had a top speed of about 135 m.p.h., but the landing speed was considered too high at 52 m.p.h., and the type did not go into production.

Not a Barnwell Type

My attention has been called to a slip I made in the article in *Flight* of March 26th in referring to the late Capt. F. S. Barnwell as the designer of the Bristol 72. Actually that machine was designed by Mr. C. H. Reid, who was Bristol's chief designer during Barnwell's absence of a couple of years in Australia. If Mr. Reid sees this (I believe he is now in Canada), I hope he will forgive my lapse of memory. He is entitled to all possible credit for the Bristol racing monoplane. C. M. P.



The S.E.4 of 1914 had a speed of 135 m.p.h. with a Gnome rotary engine of 140 h.p. Cooling was assisted by a fan.

Thirty-third of the Second Series

FRIEND or FOE?

Two Leading American Fighters : Tomahawk and Mustang

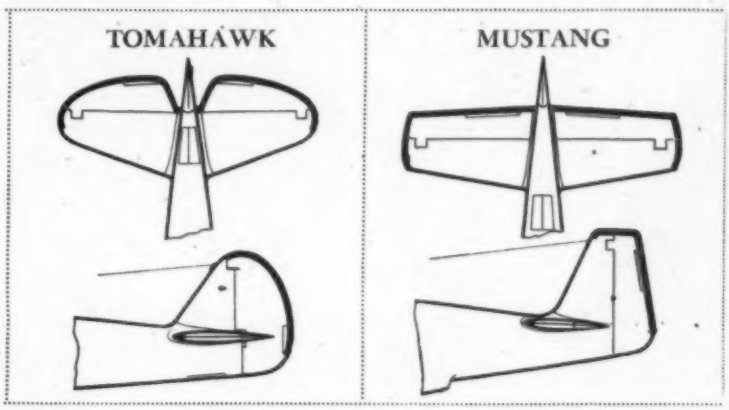
TOMAHAWK. Well rounded rudder and elevators. Back-swept leading-edge to tailplane. Retractable tail-wheel.

CURTISS Tomahawk fighters have already earned a fine reputation for themselves, especially in the Middle East, but the North American Mustang, being one of the very latest type to be produced by America for the R.A.F., has not yet had time to provide officially released news of its prowess. But that it will do so in due course is not to be doubted, for it comes from an experienced and reliable "stable," and, in fact, bears a very close resemblance to the Tomahawk and Kittyhawk fighters (whose tail groups are identical), being a low-wing monoplane powered by an Allison liquid-cooled engine.

Although this series of articles is concerned mainly with the tail assemblies of aircraft, it may be as well to mention in passing that any side view of the Mustang will show an important difference, not only in the vertical tail surfaces, but in the outline of the "power house," for the bulge of the radiator seen beneath the nose of the Curtiss types is absent from the Mustang's forward section. Instead, it will be seen slightly aft of amidships, and will, therefore, be easily discernible from a rear, underneath view, as shown in the accompanyng illustrations.

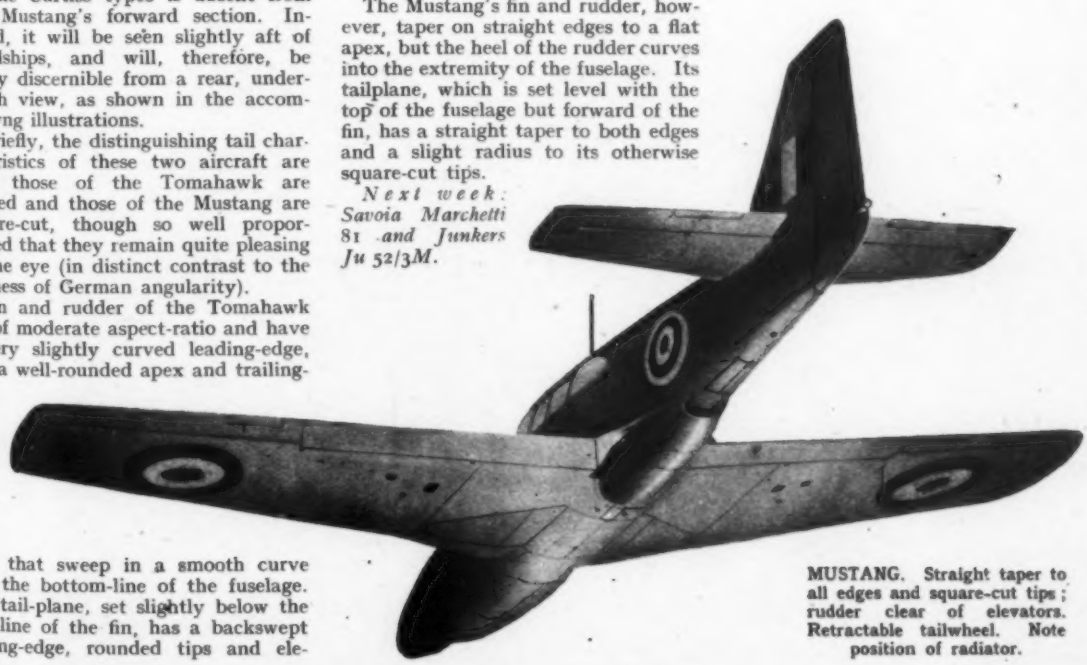
Briefly, the distinguishing tail characteristics of these two aircraft are that those of the Tomahawk are curved and those of the Mustang are square-cut, though so well proportioned that they remain quite pleasing to the eye (in distinct contrast to the ugliness of German angularity).

Fin and rudder of the Tomahawk are of moderate aspect-ratio and have a very slightly curved leading-edge, and a well-rounded apex and trailing-edge that sweep in a smooth curve into the bottom-line of the fuselage. The tail-plane, set slightly below the base-line of the fin, has a backswept leading-edge, rounded tips and elevators with a trailing-edge "bite" between which the rudder projects.



The Mustang's fin and rudder, however, taper on straight edges to a flat apex, but the heel of the rudder curves into the extremity of the fuselage. Its tailplane, which is set level with the top of the fuselage but forward of the fin, has a straight taper to both edges and a slight radius to its otherwise square-cut tips.

Next week: Savoia Marchetti 81 and Junkers Ju 52/3M.



MUSTANG. Straight taper to all edges and square-cut tips; rudder clear of elevators. Retractable tailwheel. Note position of radiator.

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ROTOL

AIR WEAPONS

Delusions Through Disasters : Novelties Always Over-rated : The Air Not One Weapon, but Many

By MAJOR F. A. de V. ROBERTSON, V.D.

WE have a Ministry of Aircraft Production, while tanks and all other weapons are dealt with by the Ministry of Supply. This lays stress on the special importance of the air. The United Nations have been defeated in several land campaigns because the enemy has been clever in using aircraft in conjunction with his land forces, and particularly with his tanks, while the Allies have lacked the necessary antidote. In such cases the antidote is usually a dominating force of fighter aircraft. The Allies have lost ships, e.g., H.M.S. *Prince of Wales* and *Repulse*, from air attack, for the same reason. All these things together have made some commentators proclaim that this is "an air war."

Such generalisations are usually dangerous and misleading. Perhaps Napoleon went as far as it is safe to go in generalising when he said (if I remember right), "Fire is everything; the rest is nothing." Those words might be twisted into "the war which we are fighting is a gunpowder war." Though the great Corsican used his cavalry (which did not rely on firearms) with effect, as well as his infantry and his artillery, he was more correct than most concocters of epigrams. He usually was correct, except when he said to Soult on the eve of Waterloo, "You think because Wellington beat you in Spain that he is a good General and that the British are good troops. I tell you that Wellington is a bad General, the British are bad troops, and it will be a picnic."

Throughout the ages there has often been a tendency to lay too much stress upon the possession by one side of a powerful weapon. Each new weapon that has been invented has been claimed by its inventor and his admirers as the dominating factor in war. Sometimes a campaign has been won by the new weapon if the enemy did not possess it and had no antidote. In prehistoric times wars were probably won by the first people to use missile weapons, and later by those who first domesticated the horse and learnt to ride it.

Historic Cases

In historic times we remember other cases. The historian Gibbon (again, if my memory does not fail me) said that the Byzantine Empire relied on the possession of "Greek fire," a precursor of thermite, which set the Saracen ships ablaze. In the thirteenth and fourteenth centuries the English longbow dominated western Europe. Cannon were said to have been used first at Crecy, but gradually gunpowder (and its successors) came to dominate the battlefield. More recently the torpedo was claimed by Mr. Whitehead and by many naval officers as a revolution in naval warfare.

The machine gun put defence ahead of attack in 1914-1917, and it is commonly asserted that the British invention of the tank won the war in 1918. Now it is claimed in many quarters that aircraft are the decisive factor in war.

When extreme claims are made for the newest weapon of the day, it is salutary to look back and remember how often similar claims have been made for new inventions in past centuries. It is an exercise which preserves our sense of proportion and perspective. One is struck by the rarity with which a novel weapon has won an important campaign. The myth of the Centaurs is said to be founded on the first acquaintance of some prehistoric Greeks with cavalry, yet the legend represents the Centaurs as having been defeated by the infantry of the Lapithæ. The longbow was not the latest invention of its age, for technically the crossbow was superior to it in range and penetration, yet I believe the crossbow never won a campaign. The torpedo has been both a benefit and a nuisance to the British Navy, but it has never deprived Britain of her naval power.

Here, perhaps, some will object that aircraft torpedoes sank two capital ships off Malaya and left Britain helpless in the Pacific. The reply is that it was the reduction of the Royal Navy by international agreement in the inter-war years which made it impossible to be strong in all the seven seas at once, and that the Pacific was, and is, the concern of the United States. Britain did not lose the Pacific campaign; she was never counted on to win it. The Pearl Harbour disaster was a case of treachery, not of war, and the weapon which did the damage there is believed to have been the bomb. H.M.S. *Prince of Wales* and *Repulse* by themselves could not have dominated all the Pacific, and would have been no match for the full battle fleet of Japan, had it been brought against them. The Japanese were merely astute enough to use torpedo aircraft against our ships when the latter had no fighter protection, as being the easiest and cheapest way to score a success.

Superiority is Not Mastery

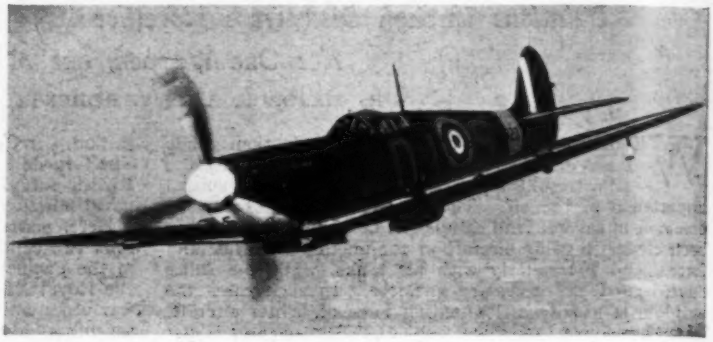
It must be admitted that there have been a number of cases since September, 1939, in which *mastery* of the air has made all the difference between success and failure. Mere *superiority* in the air has not had any such decisive effect. In the campaigns in Poland, Norway, France and the Low Countries, Greece, and Crete, the Germans held

The Bell Airacobra which, with the original 37 mm. cannon in the nose, might make a good "tank buster."

AIR WEAPONS

complete mastery of the air. In those campaigns they were never opposed by any useful numbers of fighter squadrons. Even so, in Poland and France the German successes were due to their skilful use of bombers in co-operation with their armies, and in particular with their tanks. Though the *Luftwaffe* was under independent command, the bombers were used tactically as an arm of the ground forces. Combined action after long combined practice was the secret of their success.

That mere air superiority in numbers is not in itself decisive is shown by other campaigns. In all the operations which General Wavell undertook in the Middle East, in Abyssinia, in Somaliland, and in Cyrenaica, the Royal Air Force and the South African Air Force were at first heavily outnumbered by the *Regia Aeronautica*. At first, too, the Empire squadrons had no outstanding technical advantage over their opponents. Nevertheless, they mastered the Italians completely, even as the Empire infantry beat the ground forces which they encountered. It may be said that these instances do not count for much because the Italians had not got their hearts in the fight, and that our airmen found it comparatively easy to get the better of them.



For interception work the Spitfire V embodies most of the desirable features—high speed, heavy armament and high operational height.

Cases of Failure

The same arguments cannot be used in the case of later campaigns. When Hitler invaded Russia he is believed to have concentrated a force of the *Luftwaffe* which was stronger in numbers and technically superior in aircraft to what the Russians could immediately mobilise against him. He overran enormous tracts of country, it is true, but last summer he certainly failed in all the objects of his campaign, despite his superiority in the air.

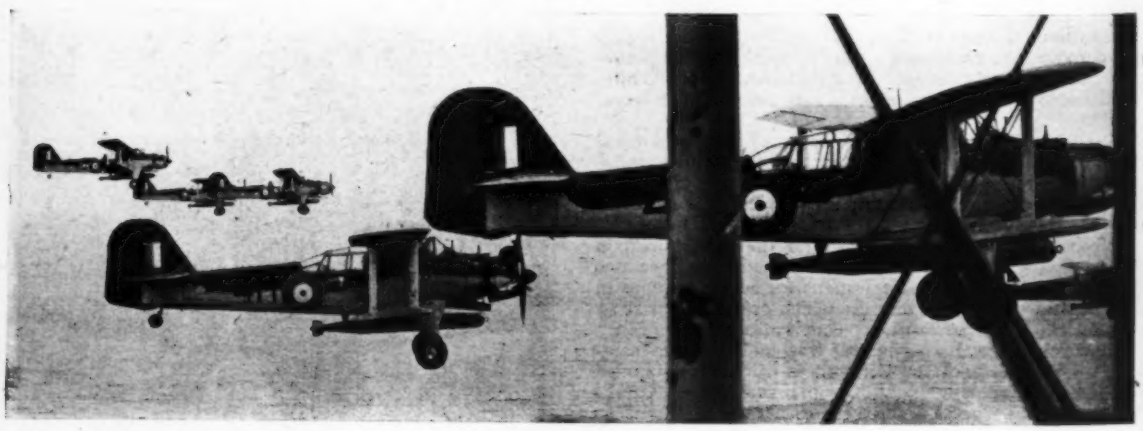
Again, in General Auchinleck's invasion of Cyrenaica, the Empire Air Forces have had a superiority over the enemy, and yet the winter's campaigning has not ended in a great British victory. This may have been (though it is still too early to be certain) because the types of aircraft sent to the Middle East were only suitably armed for interference with the enemy's supply lines and could play no effective part in the actual fighting on the ground. If so, air superiority in Libya has meant something quite different from what the Germans established in Poland and France.

Not long ago a public personage, whose name I cannot remember, lamented that only one generic name was used for all types of flying machines. The word he used was "Aeroplane," though official bulletins invariably speak of "Aircraft." The speaker thought that fighters and tank-busters and other classes ought always to be spoken of in that particular way, because they were really quite separate and independent weapons. That speaker had grasped the root of the matter. Aircraft, or "the air" as some people put it, is a term which implies many diverse weapons.

To speak of "the air" as if it were only one factor in warfare leads to confusion of thought. I have heard people say that "the air" won the Battle of Britain; it would be equally true to say that "the air" lost the Battle of Britain. In sober fact, air defence defeated air attack, and "the air" must share the credit of success and the discredit of defeat.

Many Weapons

The air is one necessary weapon in all naval operations; it is a necessary weapon in all Army operations; it is also an independent weapon. In none of these capacities can the air by itself win the war or even win a campaign, though the absence of an air arm can easily lose a campaign. The same is true of artillery and of various other arms. The great attention now paid to production of



The Fairey Albacore is a specialised aircraft for operation from carrier decks. Folding biplane wings are necessary to accommodate it within the limits of the hangar lifts.

AIR WEAPONS

aircraft is largely due to the number of times British field forces have suffered from a shortage of them.

It may be noted that we do not speak of artillery on a warship. Some years ago there was a distinction between the Royal Marine Artillery and the Royal Marine Light Infantry, but those terms have been abolished. Sea fights are usually won by superior gunfire, not by torpedoes, boarding, ramming, or bombing, and it would be true enough to say that this war and most wars for many years back have been wars of explosives, but nobody uses the expression in the same way that some people say this is an air war. We have come to realise the great distinction in function between the guns of a fleet and the artillery of an army, and it will be well if we can realise that there are comparable distinctions between the functions of aircraft in the Navy, in the Army, and when used independently.

The Bristol Blenheim is an example of a type which can be used for day bombing, close support or strategical reconnaissance.

One thing is universally recognised now, namely, that for every description of operation except night-bombing, one necessity is fighters. Day-bombers which have to venture beyond the scope of the short-range fighters have to dispense with an escort, because long-range fighters can never be the equals of the short-range fighters of the defence. In that case the bombers have to rely on their own armament. In all naval and military operations fighters are a necessity, and, of course, they are far the most important feature of air defence by day. Even in countering night-bombers, fighters are coming to play an increasingly important part.

Necessity of Fighters

It is interesting to look back a few years and remember that at one time the Air Ministry was almost contemptuous of fighters, and paid but little attention to their development and production. At one period our bombers were faster than our fighters, and at a later period the German Heinkel III was also faster than British fighters. The Air Ministry of those days seemed to overlook the fact that it must always be possible to design fighters which would be faster than any existing bomber. Fortunately those bad old days have passed, and everybody now recognises the supreme importance of having fighters above one, whatever be the operation in hand. Unfortunately, in this war, we British have not always been able to meet the demand, but that may have been due to shortage of shipping.

To the fighter pilots themselves there may seem no great difference between fighting for the defence of Britain, for the Army, for the protection of convoys, or for the protection of their own bombers. They are always expected to engage in combat with the enemy fighters, to shoot down his bombers, and to massacre his reconnaissance aircraft. It is always a case of "Attack No. X; Tally Ho!" Yet the operations in which they assist are widely diverse.

The class of aircraft which has made the greatest name for itself in this war as a contributor to victory is the dive-bomber, as used by the Germans. It is a bad aircraft, and by itself it could accomplish little or nothing. Yet, used in skilful collaboration with tanks and other ground troops, it played a major part in the conquest of Poland and France Let us British also take some credit to ourselves. We devised a special class of aircraft to do tactical reconnaissance for the Army (including spotting for the artillery) and trained some squadrons carefully for this specialised

Designed specifically for army co-operation, the Westland Lysander has more "features" in the way of slots, flaps and suchlike than any other British machine.

AIR WEAPONS

work. Few members of the public, and seemingly few Members of Parliament, know how very specialised is this work. These squadrons rarely have to indulge in actual killing, and so their pilots never get starred in the Press as "Aces" and national heroes. Yet in most cases a great military victory would be impossible without their work. The observer-pilot who directs a battery on to its target may cause the deaths of many more enemy soldiers than the bomb-aimer of most bombers can do.

Where we British have chiefly been found wanting is in the provision of various types of killer aircraft to take part in land battles. We have ordered dive-bombers from the United States, and we have recently adapted some Hurricanes to attack tanks and other ground targets. Such adaptations are rarely so successful as types designed for specific tasks. The clumsy Stuka did its job only too well.

Army and Navy Weapons

It is not the purpose of this article to attempt the ambitious task of laying down all the various classes of killer aircraft which it is desirable that our Army should have at its command. That question, it may be presumed, is being threshed out by the staff of the R.A.F. Army Co-operation Command. But it seems obvious that one class should be equipped for killing personnel, for which machine guns fired from the air are not the most effective weapon. Plunging fire, as it is called, cannot be so destructive as grazing fire (i.e., fire across flat ground), and we should note that the ingenious Japanese have been making considerable use of anti-personnel bombs in Burma.

Everyone seems to have learnt the term "tank-buster," and to be agreed that we need to develop the class. In addition to these, there are probably other classes which our Army ought to have. The artillery needs many classes of gun and many classes of shell; so it must be with Army aircraft. In all probability these classes would be almost useless for anything but their own particular work, just as the Stuka and the Lysander are. They would be Army weapons, not to be lumped together with fighters and bombers as just "the air."

The Navy is always handicapped in its choice of classes of aircraft by the limitations of the carriers. It still has one compendium class, the T.S.R. (i.e., torpedo-spotter-reconnaissance), and it started the war with another multi-purpose class, the fighter-dive-bomber. It soon had to give up that latter class, realising that a fighter must be just a fighter and nothing else. One can imagine other refinements of naval aircraft which may become facts before this war is over.

In the R.A.F. Bomber Command, the new four-engined machines are also a class by themselves, suitable only for one sort of work, namely, independent air action. Their operations may be of signal service to the Navy by damaging enemy warships in harbour or smashing up dockyards where submarines are built. They may likewise assist, say, the Russian armies by destroying tank factories or the communications which take the tanks to the eastern front. They may help to upset enemy *moral*, though there are a vast number of places in Germany where the crash of a British bomb never can and never will be heard. But they cannot win a battle for the United Nations either by sea or land. They are a separate class of weapon.

Land armies, duly equipped with suitable aircraft, may break the power of Germany. Fleets, also duly equipped with suitable aircraft, can and will break the power of Japan. Aircraft play a part in all these warlike operations, just as guns, tanks and warships play their part, and without any one of these weapons victory is not possible. Some authorities divide the functions of aircraft into two: (a) extending the range of vision, and (b) extending the range of the gun—using the term gun in the widest sense, from .303 machine guns up to two-ton bombs, which latter may fairly be called a class of shell. In fact, the bomber is a species of long-range artillery, and it attacks targets which the guns of the Army or the Fleet would engage if they could reach them. There is certainly a big distinction between the functions of seeing and shooting, but shooting needs subdivision into various classes, as explained above. To a pilot perhaps aircraft are just aircraft. But the air is not one weapon; it is many, and to talk of winning the war by "aircraft" is a meaningless generalisation.

For naval reconnaissance, bombing and torpedo work the Coastal Command find the Bristol Beaufort an adaptable aircraft.

Used in Libya and over the Continent for low-flying attacks on mechanised troops and transport, the Hurricane IIB bomber is a hard-hitter which is also able to look after itself in a scrap.

EXPERIENTIA DOCET

Officers of the United States Naval Air Corps Learn Details of Coastal Command "Control"

A model airfield complete with tarmac, runways and dispersal points is used to illustrate airfield procedure. The runways can be lighted by small bulbs to simulate flares in order that night exercises can be carried out.

In a corner of the model are the standard airfield signs which indicate to incoming aircraft whether it is safe to land and the runway which is in use.

A U.S. naval officer giving instructions over the radio to an aircraft which may be asking for landing instructions.

(Above) Working as a team, U.S. and R.A.F. officers taking incoming reports at "control."

(Left) Plotting courses of aircraft on a chart and assessing their probable time of arrival over the target area or home base, whichever it may be.

BEHIND THE LINES

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

A French Glider

THE construction of the first French all-metal glider has been recently completed by the M. Holste plant.

The glider has a span of 49.2ft., a wing area of 161 sq. ft.; Aspect ratio 15; wing loading 2.98 lb./sq. ft.; empty weight 290 lb. and gross weight 485 lb.

Special feature includes the differential slotted-type flaps and aerodynamic brakes on the upper and lower wing surfaces claimed to reduce driving.

Elettromeccanici

THE Italian Air Force is to have a new class of tradesmen: special aircraft electro-mechanics (Elettromeccanici di Bordo) are to be entrusted with the supervision and maintenance of electrical installations on all military aircraft. The pay and rank of the volunteers, which are being recruited from civilian occupation, is to be equal to that of wireless operators.

Italy's War Zones

THE provinces of Naples, Cosenza, Catanzaro and Calabria, have been declared "War Zones." It is possible that this measure has been taken as a precaution against a possible Allied invasion, or to prevent the spreading of reports on the R.A.F. raids on Southern Italy.

Drang Nach Osten

THE migration of German aircraft firms to Czechoslovakia, Austria and Poland is continuing. The Scholz & Co. Metallbau G.m.b.H., of Berlin, manufacturers of tooling equipment and aluminium alloy parts, have established a branch plant at Prague-Wissotschan. The Neue Kuehler u. Flugzeugteile-Fabriken Kurt Hoderman, of Berlin-Tempelhof, manufacturers of radiators and aircraft parts, is opening a plant in Silesia; the Luftfahrtgeraetewerke (LGW) Hakenfelde, a company affiliated to the Siemens concern, is known to be operating a plant at Krainburg, Southern Carinthia. The Transavia Company has moved from Killisch-Horn to Gotenhafen (Gdynia), and a new aircraft plant is reported to be in operation in Grandenz (Grudziadz), Poland.

New Henschel?

THE Henschel Flugzeugwerke A.G., of Schoenefeld, Berlin, well known for their "Henschel-Stukas," are reported to be now engaged on the construction of a new type of aircraft.

A New French Company

THE Société d'Etudes et de Construction Aero-Navales (S.E.C.A.N.), has established its Head Office in Marseilles. The Company has a plant at La Sayne, Var, and is to engage on the design and manufacture of aircraft and equipment. It is reported that the S.E.C.A.N. has an arrangement with the Chausson Co., of Asnieres, near Paris, for the manufacture of their radiators and fuel tanks.

Pre-military Training

THE task of preparing reserves for the thinning ranks of the *Luftwaffe* is in the hands of the N.S.F.K. This organisation, known for its share in Germany's secret war preparations, is now closely working with the Hitler Youth. At the age of 12 boys join the "Hitler-Youth Fliers" and begin with the construction of models, ranging from miniature ones to full-scale "Arado 79." At the age of 14 they commence with practical gliding to cover the prescribed curriculum for the A, B and C licence. Parallel to gliding, boys over 14 are engaged in the construction of gliders, which is to give them adequate skill in their employment in Army glider production at some later date.

Pruning the Luftwaffe

AMONG the losses in personnel sustained by the German Air Force in combats against the R.A.F. and the Soviet Air Force were names which were widely advertised by the Nazis as the most prominent exponents of the *Luftwaffe's* skill and daring. Their growing number is a further evidence of the high skill of British and Allied fighter pilots.

Here are but a few of such names: Capt. G. Czernik, Commander of a bomber squadron and holder of the Knight's Insignia to the Iron Cross. One of the *Luftwaffe's* Old Guard, he fought with the German "Condor Legion" in Spain, then in Poland, France, Jugoslavia, Greece and over this country. Col. G. Schwartzkopf, known as the "creator of the Stuka-weapon" and commodore of a Stuka squadron; holder of the Knight's Insignia to the Iron Cross with Oak Leaves. According to German reports "with him the *Luftwaffe* lost one of their best and most courageous combat pilots." Josef Grabler, member of the Air Ministry Staff, decorated with the Iron Cross, a prominent Nazi journalist. Capt. Balthalsar, of the Richthofen Squadron, shot down over the Channel. Credited with 40 air victories. The seventeenth officer of the German Army to receive the Oak Leaves to the Knight's Insignia of the Iron Cross. Lt.-Col. Emig, commander of a group of bombers, and, according to the German source, "known for his raids on the U.K." Killed in combat against Russian fighters. H. Wagner, one of the "aces," credited with 47 air victories. Capt. Joppieu, Group-Commandant of fighters. Credited with 70 (?!) air victories and holder of the Knight's Insignia to the Iron Cross with Oak Leaves. Lt. H. Hunger, of a crack bomber squadron and holder of the Knight's Insignia to the Iron Cross.

MISLEADING SIMILARITY: These Auxiliary Petrol Tanks used by German aircraft were part of the *Luftwaffe* stores captured in Libya.

IN PARLIAMENT

Extracts from the Official Records of Proceedings in the House on Matters of Interest to the Air Forces and Aircraft Industry

Debate on Production

HAVING recently returned from the Middle East, since when he had been ill with influenza, *Mr. Lyttelton*, addressing the House for the first time as Minister of Production, on March 25th, dealt on broad lines with a number of questions, such as the control of raw materials and the planning of labour, and announced the setting up of the Joint War Production Staff, composed of Sir Walter Layton, the Assistant Chiefs of Staff to the three Services, and the highest technical officers of the three Production Ministries. He was, he said, solely responsible for what went in at one end of the Raw Materials Department and for allocating what came out at the other end, and to these powers was added the control of raw materials imported from abroad.

The new programme for the production and importation of machine tools, which, of course, was one of the vital matters in securing the correct balance and volume of production, was in his control, and for this purpose the Machine Tool Controller or an officer of similar status would join his staff. The machine tools having been manufactured upon a programme controlled and laid down by him would, when they emerged from manufacture, be allotted to the various sections of the manufacturing industry in accordance with our needs at the time when they were completed. He would try to see that all the machines allocated were used to the greatest advantage.

Co-operation with Labour

In regard to labour, he stressed the fact that men and women could not be "tossed about from one place to another like raw materials" and said that his functions demanded close co-operation with the Minister of Labour who had to interest himself very closely with all the human elements in the problems such as housing, transport, welfare conditions and wages. On these matters the Minister of Labour (*Mr. Bevin*) had said he was convinced they could work in harmony.

Mr. Lyttelton then went on to deal with the fusion of military and production plans and thought, the dovetailing of our own supply and manufacture into the programme of the United States and the desirability of an improvement in the regional organisation of production. On these and other vital problems, he said, there was no suggestion, however revolutionary in character, to which he would shut his mind.

Mr. Greenwood (Wakefield, Lab.) said that every one would wish the Minister well in his gigantic task. There was a widespread feeling, among people of varied experience, that all was not well with our war effort—that the effort was not yet 100 per cent. There was that "X per cent." which we had not yet drawn out of our man-power and womanpower. The right hon. gentleman was making a valiant attempt to get a machine that would work. It was an open secret that in the production departments in the past there had not been that full team work and co-operative spirit without which the maximum effort was not possible.

Misplaced Man-power

Among several other members who spoke, *Mr. F. Messer* (Tottenham, Lab.) urged that more attention should be given to the question of misplaced manpower and to the health of workers in factories; *Mr. Spearman* (Scarborough, U.) said there was a great deal of uncoordinated competition between the Services on priority, and *Mr. Erskine-Hill* (Edinburgh, U.) urged that the Minister and his team should "approach their task with a ruthless determination to promote efficiency."

Sir J. Wardlaw Milne (Kidderminster, U.) said that it was obvious that the ordinary training of Government servants did not fit them to control industry at any time and certainly not in wartime. He raised the matter of inequality in wages and said that a well-known phrase had been twisted by the workers themselves into the words, "Never has so much been paid to so many for so little." He claimed there were cases in which, for instance, a worker getting, say, £3 a week, saw his daughter, who was carrying tea trays around, getting double.

Mr. Bevin denied there were such cases and asked for details.

Sir Wardlaw Milne replied that the last time Mr. Bevin asked for some figures he supplied a great many but had never heard a word since.

Protection and Waste

Further criticism came from *Mr. Clement Davies* (Montgomery, Ind.) who said that the Government's policy was the same as if war had not been declared and there was still the same protection for private interest and privilege; from *Major Owen* (Carnarvon, L.) who said that in factories he had visited there was considerable waste of time through having to wait for raw materials; from *Col. H. Guest* (Plymouth, U.) who said he had heard in his constituency considerable criticism about idle time in the dockyards; and from *Sir Granville Gibson* (Pudsey and Otley, U.) who observed it was common knowledge that there was much avoidable waste in factories all over the country.

Mr. Daggar (Abertillery, Lab.) accused the Government of being afraid to assume the ownership of industry, but said that "the prattle of Sir Roger Keyes about slacking caused considerable annoyance and did more harm to the prosecution of the war than a dozen cartoons in the *Daily Mirror*."

A more encouraging note, however, was struck by *Mr. Geoffrey Mander* (Wolverhampton, L.), who said that the Minister's proposals were a very substantial advance on anything done in the past, and they hoped that, in the future, he would find it possible to go a good deal farther in many directions.

Production Still Rising

In a subsequent resumption of the debate, *Mr. Assheton*, Parliamentary Secretary, Ministry of Supply, opened the proceedings by reminding the House that our war production had risen to a very high level and that output continued to rise. The 40 per cent. increase hoped for last September had been passed, and they already saw their way to go far beyond it. Nevertheless, the Government would not be satisfied with anything less than the greatest volume of production of which this country was capable.

Referring to Mr. Lyttelton's predecessor as a "stormy petrel," *Mr. Shinwell* (Seaham, Lab.) said that now Lord Beaverbrook had disappeared from the active sphere of production, the last excuse for failing to respond to the needs of the nation had been removed; the new Minister entered on his important task with the goodwill of all members.

Major Cazalet (Chippenham, U.) said that the great mass of the workers were sensible, patriotic and hard-working; the Germans were no doubt also having their production difficulties, but they did not advertise them as we did. He believed the people of this country were working from 80 to 85 per cent. of capacity and that almost everyone could do ten or 15 per cent. more. But neither machines nor individuals could work 100 per cent., which was a misleading term.

New Ideas Wanted

Mr. Granville (Eye, Ind.) appealed to the Minister to look out for new men, new minds and new ideas in industry and to give merit and ability a chance, while *Sir Roger Keyes* suggested that all work of national importance should be carried out under discipline and the workers paid the same rates of pay and allowances as the fighting services; a stop should be put to inequality of sacrifice, and if we were going to finish this war with bad feeling between the working men and the serving men, then God help us.

In the course of his reply, *Mr. Lyttelton* took Mr. Clement Davies to task for what he termed "crying stinking fish up and down the country," and added that, although Mr. Davies had perhaps intended it for the fish on the Treasury Bench, it was not a good thing at a time when everybody in the country was bending his best energies to the war effort.

Mr. Clement Davies: "I must intervene at that expression; I have never cried stinking fish to the people of this country, and I never shall."

Wireless Sets for Rescue Dinghies

Mr. Stokes asked the Secretary of State for Air whether any radio set for S O S calls is supplied to Royal Air Force bombers for use in the rescue dinghies; and, if not, why, seeing that such sets have been long in use by enemy machines, the Royal Air Force is not similarly equipped?

Sir A. Sinclair: Wireless sets have been issued for trial purposes for some time.

IN PARLIAMENT

A set of satisfactory performance is in production and will shortly be issued for general service.

Ground Gunners' Pay

Mr. R. C. Morrison asked the Secretary of State for Air what is the rate of pay for men of over two years' service now serving as ground gunners on airdrome defence?

Sir A. Sinclair: The daily rates of pay of airmen of over two years' service employed as ground gunners on airdrome defence are:—

Rank	*Rate of Pay*
A/C2	3 0
A/C1	3 6
L.A/C	4 0
Corporal	4 6
Corporal (over 4 years' service)	4 6
Sergeant	6 0
Sergeant (over 4 years' service)	6 6
Flight Sergeant	7 9
Flight Sergeant (over 4 years' service)	8 0
Warrant Officer	11 6
Warrant Officer (over 5 years' service)	13 6

In addition, these ranks receive 6d. a day war pay and will be eligible for the 6d. a day deferred pay recently approved.

Aircraft Factory Co-operation

Mr. Gallacher asked the Minister of Aircraft Production whether he has considered a telegram sent from the workers of a certain factory, drawing attention to the refusal of the management to co-operate with them on the question of increased production; and is he prepared to take any steps in the matter?

The Parliamentary Secretary to the Ministry of Aircraft Production (*Mr. Ben Smith*): I have enquired into this matter. It appears that the explanation the management gave of certain production problems at this factory was not fully understood by the men, who in consequence reached an erroneous conclusion as to the management's attitude. The misunderstanding has now been removed.

Mr. Gallacher: Would it not be a good thing to bring the whole of the workers more actively into touch with the organisation of production, instead of the attitude which is adopted in many places of the big boss at the top and the mass of untouchables down below?

Mr. Smith: The hon. Gentleman will know that an agreement has been reached with the representative bodies to set up production committees, the functions of which are set out, and which I hope at all events will have the effect of bringing managements and workpeople much closer together.

Concern Among B.O.A. Staff

Mr. Simmonds asked the Secretary of State for Air whether he is aware of serious concern among members of the flying and other staff of the British Overseas Airways Corporation; and whether he will consider immediately setting up a small independent committee to investigate the causes before there are any serious repercussions upon the important work with which His Majesty's Government has entrusted the Corporation?

Capt. Balfour: I am not aware of any serious concern among the staff of the British Overseas Airways Corporation such as my hon. Friend indicates. I do not therefore consider that any useful purpose would be served by adopting my hon. Friend's suggestion, but if he has any specific cases in mind and will give me particulars, I will invite the Corporation to look into them.

Mr. Simmonds: Has my right hon. and gallant Friend discussed the matter with the Director-General, and has he become aware of the representations which have been made by the staff to the Director-General, and will he be in a position, if I put down a similar question in a week's time, to give a more knowledgeable answer?

Capt. Balfour: Perhaps when my hon. Friend puts down his question he will have more knowledge of the British Overseas Airways Act, which, in Section 37, says the Corporation were to take into account representations made to them by any body or organisation, the membership of which comprises a substantial proportion of the class or classes of persons concerned. When Parliament passed that Act it was intended that the Corporation should be responsible for its own domestic affairs. If I have any grounds for thinking that Section 37 has not been complied with, I shall be very glad to receive representations.

Mr. Simmonds: Will my right hon. and gallant Friend discuss the matter with the Director-General, who, I think, will be able to give him a lot of interesting information?

Capt. Balfour: Certainly.

Factory Workers' Absenteeism

Col. Arthur Evans asked the Minister of Aircraft Production whether he is aware that, on Saturday, March 7th, upwards of 500 personnel of an aircraft factory, with an excellent production record, near London, left their work without permission in order to attend a greyhound race meeting in the vicinity; and if he will take the necessary steps to see that such an action is not taken in the future?

Col. Llewellin: Yes, Sir. I am aware that upwards of 500 workers who should have been at work on the afternoon in question absented themselves from work. I do not know whether any, or how many, of them went to a greyhound race meeting. The Works Production Committee is directing its attention to the absenteeism in general at the factory, and the National Service Officer is dealing with the particular case in question. I hope that those who absented themselves on this occasion will realise that their absence so dislocated the production line that, according to the best estimate I can make, it meant four fewer fighters that week for the joint needs of ourselves and our Russian Allies.

The Royal Aero Club

THE Annual General Meeting of The Royal Aero Club was held at 119, Piccadilly, London, W.1, on Wednesday, March 25th, 1942. Lieut.-Col. Sir Francis K. McClean, A.F.C., who occupied the chair, referred to the death of the Duke of Atholl, who had been President of the Club since 1921. The Duke had interested himself in many of the early experiments in flying and could truly be described as a pioneer of the flying movement.

The following were elected Vice-Presidents for the ensuing year:—The Duke of Sutherland, K.T., The Marquess of Londonderry, K.G., P.C., M.V.O., Lord Gorell, C.B.E., M.C., Lieut.-Col. The Rt. Hon. J. T. C. Moore-Brabazon, M.C., M.P., and Lieut.-Col. M. O'Gorman, C.B.

The Committee for the ensuing year was elected as follows:—Lieut.-Col. Sir Francis K. McClean, A.F.C. (Chairman), A. J. A. Wallace Barr, Captain H. S. Broad, Squadron Leader C. Clarkson, S. Kenneth Davies, Sir W. Lindsay Everard, M.P., The Duke of Hamilton and Brandon, A.F.C., Commander A. Goodfellow, R.N.V.R., Lieut.-Commander A. C. S. Irwin, R.N.V.R., Captain A. G. Lamplugh, Major R. H. Mayo, O.B.E., F. Handley Page, C.B.E., Flying Officer W. R. D. Perkins, M.P., Major H. A. Petre, D.S.O., M.C., Lieut.-Col. R. L. Preston, Major J. Stewart, O.B.E., G. H. Wilson-Fox.

One Plant, One Type

AMERICA's War Production Board has now adopted the policy of restricting each aircraft factory to the production of one type only.

Lt.-Gen. William S. Knudsen, who is production chief under the Board, was reported in the *New York Times* as having made this announcement, and was quoted as saying: "Getting one type of plane out of one plant is much faster than attempting to produce two or three types from the same factory. Speeding production is now as essential as quality."

Insect Expeditionary Force

A BOX of beetles was included in the freight of a trans-Tasman flying boat recently, and though one might find it difficult to imagine that such shuddersome creatures could have a useful mission in life, they were, in fact, travelling "on work of national importance."

Beetles, it appears, regard as a great delicacy certain pests which have been attacking New Zealand's banana crops, and this particular "army" had been sent by the N.Z. liaison officer in Sidney to his home Government to launch an attack upon the enemy insects.

It is to be hoped that this "expeditionary force" is successfully exterminating the aggressor insects and that the N.Z. news bulletins will not have to announce, "Yes, we have no bananas."

Super-crumps on Krupps

BOMBS weighing nearly two tons, each of which wiped out entire blocks of buildings, are mentioned in reports reaching Ankara from Germany on recent R.A.F. raids on Essen. German circles in the Turkish capital, in fact, describe the raids as the "war's worst," and say that more than 500 aircraft took part and that hundreds of tons of bombs were dropped on the home of the great armament plant of Krupps.

It sounds terribly grim, but this total war business was Jerry's own idea, so the grimmer we make it for him the better for the rest of the world.

LIFT, LOAD and LANDING

Functions and Functioning of the Fowler Flap : An American High-lift Device With Properties Similar to Those of the Better-known British Types

ALTHOUGH the principle of the Fowler flap was conceived as far back as 1916, it was not until the advent of the Lockheed 14 in 1937 that this device for improving the take-off and decreasing the landing speed of aircraft really came into prominence.

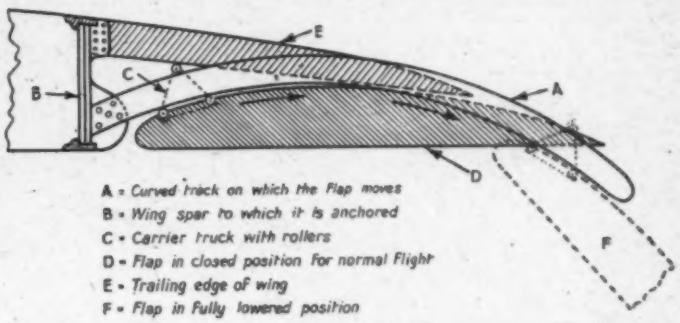
Articles on the Fowler flap have been written before, including one by its originator, Harlan D. Fowler, in *Flight* of April 17th, 1941, but the rising speed of military aircraft and their increasingly heavy wing-loading has brought the subject of auxiliary high-lift devices well to the front at the present time. It has to be remembered that the 400 m.p.h. fighter would be very severely limited in its usefulness if it could only operate from a spacious, smooth-surfaced airport, and the same applies, of course, to the weight-lifting bomber. In effect, the higher top speeds and increased loads must be obtained by extending the speed-range and not by shifting the existing speed-range higher up the scale; the landing speed must be kept down to reasonable practical limits if superior performance in the air is to be attained without a hampering sacrifice of safety in taking-off and landing.

Structural Problems

This, then, is the function of the Fowler flap; it provides high lift with increased drag for slow landings, high lift with minimum drag for quick take-off, and, when not in operation, lies snugly in a recess under the trailing-edge of the wing, forming part of the normal wing section, and thus offers no impediment to high speed.

Simple enough in its actual operation in that it merely slides rearwards and downwards on curved tracks or guides, this type of flap presented certain structural problems to be solved before its application became a thoroughly practical proposition. This is easily appreciated when one remembers the comparative thinness of the trailing-edge of a wing section which had to be still further reduced to provide accommodation for the flap in normal flight and yet remain rigid. The tracks on which the flap slides and their surrounding parts were a structural problem in themselves; the former had to pass through the whittled-down trailing-edge to be firmly secured to a specially strengthened wing beam, and the rollers, which carry the weight of the flap below flying speed and provide easy fore and aft movement, obviously call for extreme care in fitting. When the aircraft is in flight, of course, the air pressure holds the rollers firmly against the track flanges; in fact, the loads so imposed on them are such that the tracks (generally made from aluminium alloy extrusions) must have sufficiently hard flange surfaces to prevent the rollers from bedding in. These considerations by no means exhaust the list of structural problems involved, but they are sufficient to illustrate the amount of development and experimentation which was necessary before an essentially simple idea could achieve practical application.

One important feature of the Fowler flap has not yet been mentioned. The tracks are so arranged that when the flap is extended it leaves a gap between its own leading-edge and the trailing-edge of the wing. This gap acts on the same principle as the Handley-Page slot, so that, in addition to increasing the drag for landing and increasing the lift by presenting an extended wing area (thus reducing the effective wing-loading) and a greater incidence, it also maintains a laminer flow and low-pressure area above itself, adding still further to the total lift.


E
B
C
A
D
F
A = Curved track on which the Flap moves
B = Wing spar to which it is anchored
C = Carrier truck with rollers
D = Flap in closed position for normal Flight
E = Trailing edge of wing
F = Flap in Fully lowered position

A diagrammatic sketch showing the movement of the Fowler flap along its curved tracks, on each of which it is supported by a group of rollers mounted close to its leading-edge. Maintaining complete rigidity of the structure under all conditions presented a difficult problem.

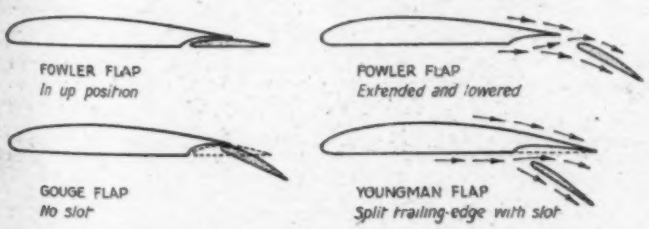
Slot Effect

When taking-off, the flap is extended part way, when it increases the lift without causing excessive drag. Incidentally, the Fowler flap has a natural tendency to retract itself in flight. This is because the accelerated velocity of the air stream through the slot sets up a low-pressure zone about the leading-edge sufficiently pronounced to overcome skin friction drag and exert a forward pull on the whole flap.

Recent N.A.C.A. tests have shown that the fitting of a 40 per cent. wing-chord Fowler flap to a normal wing has approximately doubled its lifting power when the flap was extended and deflected 30 deg. downwards.

Actual lift coefficients obtained in the tests varied from 2.3 for a 20 per cent. chord Fowler flap to 2.9 for a 40 per cent. chord flap of this type.

The British equivalent to the Fowler flap is the Gouge flap designed by Mr. Arthur Gouge, general manager of Short Brothers. It differs from the Fowler in that there is no slot effect, and is much neater as there are no unsightly projecting rails. The Handley Page flap does not slide, but obtains its effect from the variable slot between it and the wing. In the Fairey flap designed by Mr. Youngman (also the inventor of the Youngman dinghy) the flap forms an auxiliary surface which drops below the level of the main wing, in which position its attitude can be altered. Each type has special advantages.



The action of the Fowler flap is here compared with that of the Gouge flap (Short) and the Youngman (Fairey) which have been developed along parallel lines and have similar lifting properties. The arrows indicate the airflow when the flaps are down.

Correspondence

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

THE TANK BUSTER

Penetrating Power of Shells

MR. GRAHAM'S letter, printed in your issue of March 12th, contained the following surprising statements:—

(i) The energy or momentum of a 12lb shell travelling at 2,000 feet per second is the same as that of a 6lb. shell moving at 4,000 feet per second.

(ii) The ability of a shell to rise against gravitation or to piece armour depends almost entirely upon its momentum.

As regards (i) energy and momentum are not the same. As he states, momentum is measured as mass x velocity, but kinetic energy (we can neglect potential) = $\frac{1}{2}$ MV² ft. lbs. Thus while the momentum is in each case arithmetically the same, the kinetic energy of the 6lb. shell is 1,500,000 ft. lbs., while that of the 12lb. shell is 750,000 ft. lbs. In fact Mr. Abel was correct in his original statement that the smaller shell possesses twice the energy of the latter.

A shell has to do work to penetrate armour, and the power of penetration will depend upon the amount of work available, i.e., upon the kinetic energy of the shell. Thus the smaller shell will have, neglecting impact effects, twice the penetration of the larger shell. B.Sc. (Eng.), A.F.R.Ae.S.

BOMBER ARMAMENT

The Length of a 20 mm. Cannon

WITH regard to Mr. William Richardson's letter, published in your March 26th issue, I should like to say that the overall length of the 20 mm. cannon does not usually exceed 70in., and not, as your correspondent stated, 14-16ft. There is, therefore, no apparent reason why cannon of this calibre should not be mounted in a turret, bearing in mind that these are some 40in. in diameter. It is somewhat unreasonable to assume that, because of the fact that the distance between the nose and observer's "blister" on the Beaufighter is about 16ft., that the whole of this distance is occupied by the cannon. In reality, the projectiles from the guns pass along a considerable length of channel after leaving the muzzles of the cannons.

I would take the liberty of suggesting a possible turret armament consisting of two 20 mm. cannon and two 0.303 or 0.50 machine guns. This would seem to offer a degree of offensive and defensive fire moderately satisfactory under present conditions. R. H. MANLEY.

Comparative Sizes of 20 mm. and 37 mm. Cannon

MAY I respectfully suggest that Mr. William B. Richardson, in his letter published in your issue of March 26th, displays even less knowledge of the 20 mm. cannon than he attributes to Mr. A. S. Robertson?

His statement that a 20 mm. cannon is 14-16ft. long is manifestly absurd—one has only to examine any photograph or drawing of the Hurricane IIC or Spitfire VB to realise this, quite apart from the difficulties involved in making a 16ft. 20 mm. tube rigid! It is true that the Beaufighter's cannon extend back to the observer's "blister," and that the ports are forward of the pilot's seat, but one need not examine a Beaufighter "in the flesh" to discover that the muzzles are several feet behind the ports. If Mr. Richardson is still unconvinced I refer him to Mr. H. J. A. Wilson's article "Aircraft Armament" in *Aeronautics*, September, 1939, which gives the total length of 20 mm. cannon (Oerlikon and Madsen) as being of the order of 2 metres (6½ft.). And surely he does not expect us to believe that those very compact anti-aircraft Hispano-Suiza cannon are 14-16ft. long!

Your correspondent asks what has happened to the American 0.5in. machine gun. I would advise him to seek the answer in the last paragraph of his own letter.

The short-barrelled cannon-turret he mentioned—presumably he is referring to the American Armament Corporation's product—contained not a 20 mm. but a 37 mm. cannon. The article already mentioned gives the barrel length of this gun as 740 mm. (approx. 30in.). The total and barrel lengths of the long-barrelled 37 mm. weapon are given as 2,540 mm. (note—only 8ft. 4in.) and 1,850 mm. respectively, giving a "breech length" of some 690 mm. If this "breech length" is the same in each version of the gun—and one may reasonably suppose that it is—the length of the short-barrelled gun is about 1,430 mm., i.e. 4ft. 8in. Of this length at least 1ft. protrudes from the turret, so that the turret diameter is about 4ft.—hardly a *very* large turret, Mr. Richardson!

It still remains to be seen whether it would be possible to fit four 20 mm. cannon plus gunner into one turret of reasonable proportions—if tactical requirements and considerations of weight and ammunition feed made this desirable. Reverting to the article quoted, the "breech length" of a 20 mm. cannon is found to be of the same order as for a 37 mm. gun (i.e. 2-2½ft.). There seems to be no reason why four such cannon should not be mounted in one turret of 3-3½ft. diameter (the size of present-day machine-gun turrets), the gunner being between the breech-blocks—heaven help him! For nose and tail turrets we might revert to the "below the belt" mounting favoured in the Harrow and early Wellington turrets. Or the remote-control turrets patented by Fairey's, Blackburn's, Boulton Paul's, and others might be used.

But is it really worth while to mount twelve cannon, each the equivalent in weight of three or four machine-guns, in every Stirling? After all, the bomber's first object is the soldier's—to destroy the enemy, not to defend itself. Mr. Robertson admits that such heavy armament might entail the reduction of bomb load by as much as a quarter. For general defence, would not a mixed armament, like the Beaufighter's, pay better dividends? JAMES R. PALMER.

ASTRONAUTICAL RESEARCH

Only Two Societies Now Working

I NOTICED in the March 19th issue of *Flight* that Mr. Abel has contributed a letter regarding astronautics to the Correspondence section of your publication. In this letter, however, there were several mis-statements.

First, Mr. Abel stated that there were four astronautical societies in Great Britain at the present time. This is incorrect, as the Manchester Interplanetary Society was wound up sometime before the war, and the British Interplanetary Society also ceased its activities immediately after the commencement of hostilities. The two other societies are, therefore, the only ones now actually working on jet-propulsion and of these Mr. Abel gave the incorrect address for the M.A.A. It is 2, Hillview Road, Denton, Manchester, England. The address of our Headquarters was changed many months before the war and was noted in the B.I.S. bulletin at the time.

I must take this opportunity of thanking you for the interest which you have recently shown in jet propulsion and for the space which you have made available in *Flight* for the expressing of opinions on this extremely interesting subject.

E. BURGESS (President, M.A.A.).

ARMY SQUARE PEGS

Transfer Refusals Should be Explained

I WAS interested to find in your March 26th issue a letter on the subject of transfers from the Army to the R.A.F. Like your correspondent's brother, I am one of the victims of this so unreasonable cancellation, and feel most disappointed and disgusted.

I was accepted by an A.C.S.B. last September for training as an observer and was encouraged to prepare myself for the transfer by studying air navigation and such-like subjects This I did for some four months, spending most of my spare time and not a little money in making myself familiar with all aspects of an observer's duties.

Now I am informed that my transfer is off and, although I have approached my C.O. on the matter, I can find no reason for the cancellation other than that it is an Army Council instruction.

It is quite understandable that the Army should decide to accept no more applications for transfer, but surely those of us already accepted are entitled to a little more consideration.

I am desperately keen to fly, and with the little knowledge that I have picked up feel sure that the R.A.F. can make better use of me than the Army. There must be many who feel the same, and, after having our hopes raised so high, this cancellation has come as a great blow. If we could at least be given a reason for this decision we might lose a little of the bitterness we feel. "PRIVATE."

Service Aviation

His Majesty the King inspecting air crews during a visit to a Halifax squadron.

Royal Air Force and Fleet Air Arm News and Announcements

The R.A.F. is Twenty-four

TWENTY-FOUR years ago, on April 1st, 1918, the R.A.F. was first officially formed, under the terms of the Air Force (Constitution) Act of 1917. The amalgamation of the R.F.C. and the R.N.A.S., recommended by the Air Organisation Committee under General Smuts, became an accomplished fact. Britain's two air arms were merged into a single fighting Service. An Air Council had been set up in January, 1918. First Air Minister was Viscount Rothermere. He was succeeded, on the creation of the R.A.F., by Viscount Weir. Shortly afterwards, in January, 1919, Mr. Winston Churchill became Secretary of State for War and Air, a post he held for two years.

Chief of the Air Staff at the time of the R.A.F.'s formation was Major-General Sir Hugh (now Viscount) Trenchard. Following the creation of the Force, Major-General Sykes took over for a year; then in April, 1919, Lord Trenchard again became C.A.S., holding the post for ten years—the longest tenure of any holder of that key position in the Empire's defence.

The R.A.F. ended its first year of life as the biggest and most powerful air force in the world. At the time of the Armistice Britain's R.A.F. comprised 188 operational squadrons with a first line strength of 3,300 aircraft. Altogether the R.A.F. possessed 22,647 aircraft, 103 airships, and had a total personnel strength of 291,175, including over 27,000 officers, of whom more than one-half were trained pilots. This mighty force was backed by the world's greatest and most efficient aircraft industry, with an output of about 3,500 airframes a month, and an even larger output of aircraft engines.

During its twenty-four years' existence the R.A.F. has fought in two major wars and several minor ones. It has gained many victories; faced many vicissitudes. Under the disarmament policy the R.A.F. at one time was reduced to the level of fifth or sixth among the air forces of the world. But its training and its equipment were kept at a high standard. In the days of peace it set up records for speed, distance and height which amazed the world. To-day, again grown powerful, with a strength now equalling that of its most powerful enemy, the German Luftwaffe, it is fighting offensively on several air fronts. From the Arctic to the tropics; from the Atlantic to the tropical jungles of the East—the R.A.F. carries the war hard against the Axis aggressors organised for war and plunder. Always the R.A.F. has lived up to the spirit of its motto, "Per Ardua ad Astra."

P/O. T. H. Carson who was awarded the D.F.C. for his share in the attack on the *Scharnhorst* and *Gneisenau*.

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

BAR TO THE DISTINGUISHED FLYING CROSS.

Act. Sqn. Ldr. R. E. P. BROOKER, D.F.C., No. 232 Sqn.—This officer has continuously led the squadron into action against largely superior numbers of enemy aircraft at Singapore and in the Netherlands East Indies. He has displayed gallantry, determination and cheerfulness in the face of heavy odds.

Act. Sqn. Ldr. K. W. TRUSCOTT, D.F.C., R.A.A.F., No. 452 (R.A.A.F.) Sqn.—This officer is a skilful and courageous fighter pilot. Since May, 1941, he has participated in a large number of sorties and convoy escorts. Throughout, he has shown a fine fighting spirit and, in combat, he has destroyed 11, probably destroyed three and damaged a further two hostile aircraft. One day in February, 1942, Sqn. Ldr. Truscott participated in an attack on an enemy destroyer which was left in a damaged condition with black smoke issuing from behind the bridge. The next day, he assisted in the destruction of a German floatplane.

DISTINGUISHED FLYING CROSS.

Flt. Lt. K. R. SUTTON, No. 23 Sqn.—This officer has proved himself to be a first class operational pilot. He participated in the intensive air fighting in France during May and June, 1940. During one sortie, he destroyed one and damaged another enemy aircraft before being shot down himself. Since then, Flt. Lt. Sutton has taken part in numerous patrols both by day and by night. As a flight commander he has shown sterling qualities and he has been mainly responsible for the high standard of efficiency of his flight.

Act. Flt. Lt. A. E. BERRY, No. 3 Sqn.—This officer has taken part in operational flying over a long period during which he has participated in sorties over enemy territory, attacks on shipping and in night fighting operations. As a flight commander he has shown great skill and leadership, combined with excellent organising abilities. During January, 1941, Flt. Lt. Berry shot down a Heinkel 111, probably destroyed a Junkers 88 and assisted in the destruction of a Dornier 215.

Act. Flt. Lt. J. T. SHAW, R.A.F.V.R., No. 3 Sqn.—This officer has been engaged on operational flying since November, 1940. He has taken part in operations against enemy aircraft by night, in numerous daylight sorties over enemy occupied territory and in many attacks on shipping. Flt. Lt. Shaw has led his detachment with exceptional

Sgt. Newi t, Flt. Sgt. Palmer, W/O. Crump, Sgt. Wilson and W/O. Noden leaving Buckingham Palace after receiving their decorations at an Investiture.

skill and keenness and he has destroyed at least three enemy aircraft.

F/O. R. C. FUMERTON, R.C.A.F., No. 89 Sqn.—One night in March, 1942, this officer engaged a Heinkel 111 during an enemy air raid over the Suez Canal Zone. Observing the enemy aircraft in the moonlight, F/O. Fumerton delivered a good burst and, although he was wounded and his aircraft damaged by the enemy's return fire, he continued the attack and set the bomber on fire. Although the undercarriage of his aircraft had been put out of action, F/O. Fumerton made a safe landing. The raiding aircraft descended on to the sea, its crew being captured.

P/O. R. M. AHALT, R.C.A.F., No. 150 Sqn.—As captain of aircraft, this officer carried out two operational missions on successive nights in March, 1942. In the face of heavy anti-aircraft fire he deliberately descended to a low altitude in order to identify the exact target which, on both occasions, was successfully bombed. Throughout a long record of operational flying, this officer has displayed high courage, determination and efficiency.

Sqn. Ldr. S. G. STILLING, No. 205 Sqn.—On January 6th, 1942, whilst carrying out an attack on an enemy target in the face of intense ground fire, Sqn. Ldr. Stilling's aircraft was damaged, the port oil tank being hit and one engine put out of action. In spite of this he succeeded, with great skill and coolness, in bringing the aircraft safely back to base. Sqn. Ldr. Stilling has always displayed great courage and determination in carrying out his attacks.

Flt. Lt. R. A. ATKINSON, R.A.F.O. No. 205 Sqn.—This officer has carried out many long-distance reconnaissance sorties and on several occasions he has successfully beaten off attacking enemy aircraft.

One morning in December, 1941, Flt. Lt. Atkinson's flying boat was attacked by enemy aircraft when 300 miles N.E. of Singapore. The enemy were immediately engaged, but after a 15-minute combat the flying boat's petrol tank was hit and exploded; the aircraft caught fire and was forced to alight on the sea.

The crew, of which two were wounded, were all suffering from burns. They were unable to launch the dinghy and had to remain in the sea for six and a half hours before being rescued by a Dutch submarine. Throughout, Flt. Lt. Atkinson set an excellent example by his great steadiness and courage.

Flt. Lt. A. D. PHILLIPS.—This officer has carried out numerous valuable long-distance reconnaissances. These were often carried out in very bad weather and, on several occasions, his aircraft has been attacked and damaged by enemy aircraft. Flt. Lt. Phillips has obtained much valuable information during his sorties and has always displayed great skill, courage and devotion to duty.

Act. Flt. Lt. J. V. C. WYLLIE, No. 24 Sqn.—On the night of February 28th, 1942, when the enemy were attempting to land in Java, this officer carried out three low-level attacks in the face of accurate anti-aircraft fire and succeeded in scoring a hit on a 6,000-ton enemy transport. Flt. Lt. Wyllie has always displayed great determination to press home his attacks and has proved himself to be an inspiration to all.

F/O. A. G. DONAHUE, R.A.F.V.R.—This officer has carried out many low-level reconnaissance sorties and has successfully attacked enemy shipping and ground objectives. On one occasion, whilst carrying out an attack against enemy troops attempting a landing, F/O. Donahue silenced the enemy's fire, thus enabling the rest of the formation to press home their attacks with impunity. He has destroyed several enemy aircraft.

DISTINGUISHED FLYING MEDAL.

Sgt. (now P/O.) C. B. WAREHAM, R.N.Z.A.F.—This airman has carried out many long-distance reconnaissance sorties, often in bad weather. He has obtained much valuable information of enemy targets, and has displayed great skill, keenness and courage.

Flt. Sgt. S. R. STREETER, No. 23 Sqn.—This airman has been engaged on operational flying for the past two years. He has served with several squadrons and has participated in numerous missions over enemy and enemy occupied territory. Since joining his present squadron, Flt. Sgt. Streeter has carried out 21 sorties. He is an exceptionally efficient air observer and he has always shown the greatest keenness and determination throughout his operational career.

Sgt. S. G. WELSHMAN, R.A.A.F.—One night early in March, 1942, this airman was engaged on a reconnaissance flight over the Benghazi area when he observed enemy fighters below him. Nevertheless, he decided to complete his mission. Whilst making his run over the harbour, his aircraft was damaged by anti-aircraft fire and then attacked by Messerschmitt 109s. By skilful tactics, Sgt. Welshman finally evaded his attackers and eventually succeeded in flying his badly damaged aircraft safely back to his base. He secured valuable information.

THE KING has been graciously pleased to approve the following awards:—

BRITISH EMPIRE MEDAL (MILITARY DIVISION).

Sgt. J. IRVINE, R.N.Z.A.F.—One night in November, 1941, Sgt. Irvine was wireless operator-air gunner in an aircraft which crashed on an airfield and burst into flames. Sgt. Irvine was catapulted through the roof and fell some distance away. On recovering from the shock, and realising that he was comparatively uninjured, he dashed to the burning aircraft, entered the cockpit, and extricated the pilot who was unconscious. Sgt. Irvine's prompt and gallant action, in face of considerable risk and regardless of the shock he had sustained in the crash, undoubtedly saved the life of the pilot. In carrying out the rescue Sgt. Irvine sustained severe burns on his hands and face.

Cpl. J. TAYLOR, G.M.—One morning in January, 1942, an aircraft crashed. Cpl. Taylor, who was on duty in the vicinity, immediately went to the scene of the accident. Just before he reached the aircraft, it burst into flames and, although he was warned that the building on which the aircraft had crashed was a hand grenade store, he unhesitatingly plunged into the flames in an attempt to rescue the crew. First, he extricated one member, whose clothes were burning furiously; he then re-entered the wreckage and dragged out another member.

Borrowing another pair of gloves, his own having been burnt off, Cpl. Taylor, assisted by another airman, made further attempts to save the remaining members of the crew, and succeeded in extricating two further bodies.

By now his hands, feet and clothing were badly burned and he was in an exhausted condition, but, even so, it was with great difficulty that others prevented him from re-entering the burning aircraft. Shortly afterwards he was admitted to sick quarters suffering from severe burns. Throughout, Cpl. Taylor displayed great gallantry and a complete disregard for his own safety. Cpl. Taylor, G.M., was born in 1910, at Aughnacloy, Tyrone, where his home still is. He was a cook before enlisting in June, 1940, as aircrafthand. He became a ground gunner. He won the George Medal in May, 1941, for his efforts to rescue an airman from a crashed and burning aircraft. Cpl. Taylor was clad only in his football kit at the time.

Cpl. R. B. WHITTINGTON, R.A.A.F.—In September, 1941, an aircraft, when taking off, crashed into another which was parked on the edge of

The Soviet Ambassador decorating R.A.F. officers for their service in Russia. (Left to right): P/O. Charlton Haw, Sqn. Ldr. A. G. Miller, Sqn. Ldr. A. H. Rook and Wing Cdr. Ramsbottom-Isherwood who is receiving the Order of Lenin from M. Maisky.

the runway. Both burst into flames. On hearing the crash, Cpl. Whittington raced to the scene in the nearest transport. He found the wing tanks blazing and a fire tender already in action. The pilot was unconscious in the cockpit. With utter disregard for his own safety, Cpl. Whittington jumped on to a wing of the plane, undid the pilot's harness and began to drag him from the cockpit.

When he had nearly extricated him, the medical officer of the unit and a leading aircraftman arrived and helped Cpl. Whittington to get the pilot clear before the oxygen bottles and petrol tanks exploded and the aircraft was completely destroyed. The pilot received facial injuries in the crash, and was burnt on the arms and legs. He owes his life to the prompt action of Cpl. Whittington whose courage was of a very high order.

Roll of Honour

Casualty Communique No. 123.

THE Air Ministry regret to announce the following casualties on various dates. The next-of-kin have been informed. Casualties reported "in action" are due to flying operations against the enemy; on "active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Royal Air Force

KILLED IN ACTION.—Sgt. H. A. Driscoll; Sgt. C. T. Jennings; Sgt. C. A. Little; Sgt. A. W. Pettman; Sgt. J. Redfern.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. R. N. Barcroft; P/O. H. Brant; P/O. H. S. Brown; Flt. Sgt. R. V. Collinge; Sgt. A. Y. Condie; Sgt. A. A. Cormack; Flt. Sgt. R. J. David; P/O. D. W. D. Faint; Sgt. R. G. G. Fairweather; P/O. D. K. Fawkes; P/O. G. C. Frew; Sgt. D. W. Gillies; Sgt. P. J. M. Hamilton; Sgt. T. Jackson; P/O. B. W. M. Jones; Sgt. B. T. Kearsley; Sgt. D. G. Kemp; P/O. J. E. King; Sgt. M. Koransky; Sgt. G. F. Lister; P/O. D. W. Mason; Sgt. D. J. Mennie; Sgt. D. W. Mercer; Sgt. K. H. Price; Sgt. A. T. Thomas; Sgt. F. Woodcock.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. L. H. Anderson; Sgt. C. D. Asher; Sgt. R. C. Barker; Sgt. N. Baron, D.F.M.; Grp. Capt. J. F. T. Barrett, D.S.O., D.F.C.; Sgt. D. L. Beney; P/O. G. Botham; Sgt. F. W. Black; Sgt. M. R. Bowes; Sgt. W. C. E. Broomhead; Flt. Sgt. C. W. D. Brown; Sgt. J. M. Christie; Sgt. K. G. H. Davies; Flt. Sgt. E. E. Dowse; F/O. L. Duckworth; P/O. H. J. A. Dyer, D.F.M., Flt. Sgt. J. Elkington; Sgt. F. Elliott; P/O. E. J. D. Guild; Sgt. K. J. Haine; Sgt. A. W. Handley; Flt. Lt. A. B. Harrison; P/O. W. G. Henderson; Sgt. H. J. Ingram; Sgt. T. H. B. Jones; Act. Sqn. Ldr. J. O. Lalor; Sgt. G. Law; Sgt. E. C. Mathewman; Sgt. A. Needham; Sgt. H. J. W. Newnes; Sgt. J. E. Nicholson; Sgt. J. O'Donnell; Sgt. E. Owen; Sgt. C. P. Penberthy; Sgt. G. R. Ramsey; Flt. Sgt. A. G. Reading; Sgt. G. Shearer; Flt. Sgt. W. C. Shepherd; Sqn. Ldr. C. D. S. Smith, D.F.C.; P/O. L. A. Smith; Sgt. B. L. Thomas; P/O. E. A. W. Thompson; Sgt. R. W. Ullmer, D.F.M.; Wing Cdr. G. E. Valentine, D.S.O.; Act. Flt. Lt. H. Waples; P/O. G. P. Wise, D.F.M.; Flt. Sgt. F. J. Wood; Sgt. K. R. Wood; Sgt. T. G. Young.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Flt. Lt. E. W. Seymour-Hosley.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. P. M. Bonn; Flt. Sgt. H. A. Oliver.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. C. L. Broadfield; Sgt. J. E. Checkley; A/C.2 H. Gorman; Sgt. A. A. Largent; Sgt. G. McIntyre; Sgt. W. W. Morton; Sgt. F. D. Orgar; Sgt. R. L. Pitkin; Sgt. H. W. Sangerhaus; Sgt. J. R. Welsh.

MISSING.—Sgt. F. W. Ashfield; Flt. Sgt. K. Ashurst; Sgt. J. H. H. Baness; Sgt. C. L. Belcher; F/O. S. Birch; Sgt. E. F. G. Blair; Sgt. J. Canavan; Sgt. R. Clark; P/O. J. T. B. Clough; Sgt. L. A. Corby; P/O. D. D. Cowland-Cooper; Sgt. J. Croll; Sgt. C. Dancer; A/C.2 A. S. Day; P/O. L. A. Emmerton; Sgt. C. J. Foote; F/O. E. G. Fowler; Sgt. G. R. M. Garrard; Sgt. H. P. A. Guilfoyle; Sgt. D. Hewitt; P/O. P. J. Hill; F/O. G. R. Jenkins; Flt. Sgt. A. L. E. Johnston; Flt. Sgt. N. J. Jones; Sgt. D. F. Keane; Sgt. S. V. King; Sgt. C. L. Lee; P/O. P. W. Lowe; Wing Cdr. J. F. Maffett; Sgt. T. H. Mate; Sgt. A. S. Maynard; Sgt. R. O. R. Morgan; Sgt. C. A. Pacey; Sgt. A. G. E. Pearce; Act. Flt. Lt. W. E. Perrin; Sgt. J. S. Pullen; Sgt. G. F. G. Rackstraw; Sgt. J. H. F. Redhead; Sgt. P. L. Reynolds; W/O. B. L. Robertson; Sgt. C. F. Ryall; Sgt. J. Sackfield; Sgt. J. A. Sandy; Sgt. J. A. Steele; Wing Cdr. G. F. Simond; Sgt. H. K. Sprason; F/O. E. G. T. Symons; Act. Flt. Lt. D. W. Thomas; Sgt. L. C. Toghill; Sgt. R. E. Tomlinson; P/O. J. R. Topping; P/O. M. A. Torpy; L.A/C. E. C. Turner; Sgt. W. V. Walters; Act. F/O. H. Wathey, D.F.M.; Sgt. S. W. A. Way; Flt. Sgt. G. F. Webb; Flt. Sgt. P. H. G. Webster; Sgt. E. Weightman; Sgt. J. A. Woodroffe.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. A. J. Knapp; L.A/C. S. Morrison.

KILLED ON ACTIVE SERVICE.—L.A/C. D. H. Adlam; Sgt. H. Brown; Sgt. F. E. Coulson; Sgt. J. W. Dalgliesh; L.A/C. C. E. Douglas; Sgt. A. Glossop; A/C.2 W. Hampson; Sgt. W. Hutchinson; P/O. T. B. Macnamara; Sgt. J. M. Mitchell; P/O. R. A. Ray; Flt. Lt. N. Stone, A.F.C.; Sgt. M. A. West.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. H. W. Evans.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. E. Butt; Sgt. A. D. Cragg; Sgt. W. H. Dickens; Sgt. I. Price.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.1 W. Entwhistle.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—A/C.2 R. Barnes; L.A/C. D. L. Calton.

DIED ON ACTIVE SERVICE.—A/C.2 P. N. Bangay; A/C.1 A. T. Buckingham; A/C.2 C. C. K. Dagg; Cpl. J. W. Denton; Sgt. R. Fenney; A/C.2 E. Gavin; A/C.1 D. F. Husson; A/C.1 F. G. Knight; A/C.1 R. Jamieson; A/C.1 G. Pearson; Cpl. W. J. Phillips; L.A/C. R. E. M. Read A/C.1 G. H. Weston; Cpl. V. F. White; A/C.1 J. Winter.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. F. A. Black; F/O. I. R. Campbell.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.2 D. E. Brierley; L.A/CW. I. E. Ransome.

Royal Australian Air Force

KILLED IN ACTION.—Sgt. K. M. McBride.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. P. G. Crittenden.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. D. N. R. Armstrong; Sgt. R. L. Barrett; Sgt. H. D. Grimes; Sgt. D. J. McKenzie.

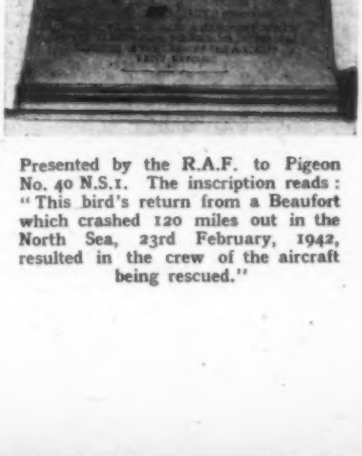
PREVIOUSLY REPORTED MISSING NOW REPORTED KILLED IN ACTION.—Flt. Lt. L. E. Knowles; P/O. N. Lees.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. P. P. Handfield; Sgt. E. G. Holloway.

MISSING.—Sgt. J. M. Bonnefin; Sgt. J. B.

The "evidence of things hoped for." Fitting a 16mm. cine-camera to the leading edge of a cannon-armed Hurricane II. The camera is operated by the remote control gun trigger.

A close-up of the windscreen of the Bell Airacobra showing the American reflector sight and the bullet-proof shield which is carried inside in a welded tube frame.



Presented by the R.A.F. to Pigeon No. 40 N.S.1. The inscription reads: "This bird's return from a Beaufort which crashed 120 miles out in the North Sea, 23rd February, 1942, resulted in the crew of the aircraft being rescued."

SERVICE AVIATION

Brady; Sgt. H. R. Holt; Sgt. J. Logan; P/O. P. R. Pollock; Sgt. A. L. Strang; Sgt. J. D. Sandilands; Sgt. H. H. Schultz; Sgt. E. P. W. Sellars; Sgt. B. B. Smith; Sgt. W. R. Wren.

KILLED ON ACTIVE SERVICE.—P/O. R. A. White.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Lt. S. Thompson; A/C.1 E. J. Webber.

DIED ON ACTIVE SERVICE.—P/O. A. H. Odgers.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION—Sgt J. A. Cover; Sgt. E. C. E. Myers; P/O. N. Woodward.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. F. C. Snead.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. W. A. Keogh.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. G. A. Jackson.

MISSING.—P/O. H. G. Anderson; F/O. L. Cowperthwaite; P/O. R. E. Drysdale; Flt. Sgt. W. W. Fairbrother; Sgt. W. B. Lenover; P/O. J. E. Lister; Sgt. J. G. Purcell; Flt. Sgt. M. A. Reid; Sgt. J. J. Roche; Sgt. T. J. Thomas; Flt. Sgt. J. F. P. Vezina; Flt. Sgt. N. Williamson.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. D. T. Vail.

KILLED ON ACTIVE SERVICE.—P/O. R. S. Brimacombe; Sgt. T. L. P. Delorme; Sgt. I. J. Eady; Sgt. W. J. T. Flagg; Sgt. T. E. Foster; Flt. Sgt. A. W. Goulding; Sgt. J. D. L. Graham; Sgt. J. C. Harris; P/O. A. L. Logan; Sgt. R. G. E. Whale.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. L. H. Campbell-Rogers.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. W. J. Hodge; Sgt J. D. D. White.

Royal New Zealand Air Force

KILLED IN ACTION.—Sgt. R. J. Newman.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. R. J. Minnis.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. R. Nation; Sgt. I. L. Reid; Sgt. G. F. Williams.

MISSING, BELIEVED KILLED IN ACTION.—P/O. R. Crozier.

MISSING.—P/O. A. R. Abbott; Sgt. C. H. Mulholland; P/O. A. O'Brien; Sgt. F. S. Partridge; Sgt F. C. Sergent, D.F.M.; Sgt. W. B. Stehr.

South African Air Force

KILLED IN ACTION.—Lt. W. D. Herbert.

Casualty Communique No. 124.

Royal Air Force

KILLED IN ACTION.—Sgt. P. S. Ballard; Sgt. J. E. Blackburn; Sgt. T. W. Coy; P/O. A. J. W. Froggatt; Sgt. C. A. Frost; Sgt. F. R. Law; Flt. Sgt. J. E. McAlister; Sgt. J. D. MacK. Prentice; Sgt. E. F. Rawlings; Sgt. H. F. Thompson; Flt. Sgt. D. Wormleighton; Sgt. D. A. Young.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. R. J. Austin; Sgt. J. B. Bell; Sgt. D. Blake; F/O. C. Cookson; Flt. Sgt. W. H. Dulwich; Sgt. R. E. French; Act. Flt. Lt. R. A. Lewis; P/O. R. R. Price; P/O. A. S. Ramsay, D.F.C.; Sgt. A. Stringer.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. D. H. Allan; Sgt. W. Alton; Sgt. J. D. R. H. Archibald; Sgt. J. H. Atkin; Sgt. W. H. Balch; P/O. J. Bell; Sgt. N. O. Bennett; Sgt. J. M. Blundell; Sgt. T. C. Boyle; Sgt. W. R. Bradord; P/O. D. E. W Brown; Act Flt. Lt. D. A. Buchan; Sgt. W. Calver; Flt. Sgt. S. S. Carlile; Sgt. N. C. J. Carter; Sgt. D. A Claburn-Detrez; Flt. Sgt. W. Cockburn; Sgt. N. I. Cotterell; Sgt. E. Curle; P/O. S. H. Dale; Sgt. J. A. Donald; Sgt. A. C. Edwards; Sgt. N. V. Edwards; Sgt. J. S. Else; Sgt. D. J. Farrell; Sgt. V. G. Farrow; Sgt. A. W. Felton; Sgt. N. Fenton; Sg. G. T. Friend; Sgt. F. Garde; Sgt. H. Godfrey; Sgt. R. K. Godfrey; Sgt. E. F. Gresham; Flt. Sgt. F. J. Hardiman; P/O. S. Hartley; Sgt. H. Heald; Sgt. D. A. Hinde; Flt. Sgt. J. Hood; Sgt. W. K. Jenkins; P/O. R. A. Johnston; Sgt. T. G. Jones; Flt. Sgt. H Lilley; Flt Sgt. V. H. Marks; Sgt. E. G. Martin; Sgt. J. C. Mason; Sgt. J. R. Mason; Sgt. A. J. Mitchell; Sgt. B. J. Monk; Sgt. K. Naylor; Sgt. W. J. Ordway; Sgt. S. L. T. Paine; Sgt. T. Porteous; P/O. W. C. Richards; Sgt. W. S. Robinson; Sgt. J. V. Rowe; Sgt. E. C. Saunders; P/O. P. G. Shillitoe; Sgt. A. D. Shuckburgh; Sgt R. W. J. Smaldon; Flt. Sgt. H. Smith; Sgt. J. Tague; Sgt. J. Taylor; Sgt. P. G. Thompson; Flt. Sgt. D. H. Todd; Flt. Sgt. R. B. Turner; Sgt P. J. Walder; Sgt. R. L. Warburton; P/O. L. Ward; P/O. J. H. E. Warner; Sgt. R. G. Wernham; Sgt. A. R. N. Whitcher.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—F/O. A. R. Zatonski.

WOUNDED OR INJURED IN ACTION.—Sgt. J. L. Bluff; Sgt. J. E. Patterson.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. C. H. Atkinson; Sgt. F. G. Cross; Flt. Sgt. M. C. Daniell; A/C.1 J. E. Gardner; Cpl. C. Hacker; Sgt. E. J. Hartley; Act. Flt. Lt. C. J. Norton; F/O. J. E. Ramshaw; Sgt. E. Talbot.

MISSING.—Sgt. R. S. Anderson; Sgt. G. A. Barnett; Sgt. P. D. Bishop; Sgt. A. W. Blake; Sgt. R. Burgess; Act. Flt. Lt. R. I. Chaffe; Sgt. W. A. Croft; Sgt. B. F. Cull; P/O. A. T. Daly; Sgt. F. H. Denton, Flt. Sgt. B. T. Dundas; Flt. Lt. E. J. Durston; Sgt. T. G. Evans; Sgt. E. M. C. Fahmy; Sgt. E. L. Fiske; P/O. J. E. Green; Sgt. H. C. Hadley; Sgt. P. Harrison; Sgt. R. F. W. Hirst; P/O. K. Le R. Holder; Sgt. E. V. Hopkinson; Flt. Sgt. R. E. Howett; Act. Flt. Lt. P. R. Hughes; Sgt. G. C. Jobling; Sgt. L. W. Jones; Sgt. N. F. Jordan; Sgt. S. A. Kent; Sgt. S. R. McLeod; Sqn. Ldr. T. Mathewson; Sgt. P. F. Monk; Sgt. J. R. Moody; Sgt. A. F. Muris; Sgt. E. G. Oakley; F/O. J. W. Potter; Sgt. R. Rowley; Act. F/O. W. H. Stephens; Sgt. G. Taylor; P/O. D. A. Tedford; Flt. Sgt. S. Walker; Sgt. S. B. Wilson; Sgt. N. D. Wright; Sgt. E. Young.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. A. W. McGarva; Sgt. A. R. B. Rylatt; Sgt. D. Thomas.

KILLED ON ACTIVE SERVICE.—Sgt. J. M. Ambler; W/O. N. Arnold; A/C.1 E. J. N. L. Barlow; Sgt. A. S. Beard; Sgt. B. P. Blowers; P/O. K. H. Bottrill; Sgt. Plt. S. H. Bridge; Cpl. K. J. Howes; A/C.1 R. W. Kemp; L.A/C. A. McDowall; L.A/C. R. E. C. Pollard; Sgt. T. P. F. Poole; L.A/C. E. Portnell; A/C.2 W. Pownall; Sgt. J. M. Roberts; P/O. J. M. Ross; Sgt. J. Rostern; L.A/C. B. W. Russell; L.A/C. J. D. Shenfield; Sgt. C. Taggart; A/C.2 F. Tomkinson; Sgt. C. C. Wilson; Sgt. W. L. B. Wright.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—L.A/C. K. A. Eaton; P/O G. N. C. Mieville; Sgt. H. B. K. Moss; Flt. Lt. O. R. Pilsworth.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. Taylor.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—Sgt. R. M. Shaw.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.P N. C. Cranny; L.A/C. T. Cronin; Cpl. R. A. Dale; Sgt. G. W. Drinkwater; Sgt. G. Kentish; Sgt. J. A. Lancaster; L.A/C. E. C. R. Moore; A/C.2 W. R. Perks; A/C.1 C. St. J. Shaw; P/O. W. McN. Somerville; Sgt. J. Stevens; P/O. J. M. Williams.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. E. E. Browne; Sgt. R. W. Campbell; Sgt. G. W. McRae.

DIED ON ACTIVE SERVICE.—L.A/C. C. E. J. Blyth; W/O T. L. Calvert; Cpl. O. F. Cheverton; Cpl. C. W. Eddie; A/C.1 F. R. Gibson; Sgt. J. F. Green; L.A/C. C. W. Johnson; A/C.2 J. W. Last; A/C.1 F. Levett; A/C.2 N. Myers; A/C.2 C. J. O. Nerush; A/C.2 D. E. Powell; Cpl. A. P. Rutherford; L.A/C. A. Upton; Cpl. A. J. Willis.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. W. H. Smyth.

Teaching the starting procedure of the Allison engine on a North American Mustang.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.2 A. O'Brien.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. R. F. Curlewis; P/O. V. L. Dearman; Sgt. W. S. Denby; Sgt. B. E. R. Fitzgerald.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. W. G. Dalco; Sgt. J. G. Merrett.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. R. K. Swann.

MISSING, BELIEVED KILLED IN ACTION.—P/O. K. L. Blackham.

MISSING.—P/O. J. G. Courtney; Sgt. J. J. Davey; Sgt. H. G. McKean; Sgt. C. R. Scott; Sgt. J. R. Wormwood.

KILLED ON ACTIVE SERVICE.—Sgt. D. J. Fraser; L.A/C. T. E. D. Tighe.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. W. T. Sheppard.

PREVIOUSLY REPORTED MISSING NOW REPORTED PRISONER OF WAR.—F/O. F. F. H. Eggleston.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. C. D. G. Brown; Flt. Sgt. E. E. Hale; P/O. R. McC. Murchie; Flt. Sgt. J. H. Oliver.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt G. K. Henson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. E. G. M. Anderson; Flt. Sgt. J. W. Archibald; Sgt. H. G. Dickson; Flt. Sgt. G. H. Edmondson; Sgt. C. S. R. Edwards; Sgt. H. W. Fish; P/O. C. D. Hewson; Sgt. M. S. Humphrey; Flt. Sgt. J. J. McIntyre; P/O. H. L. Myers; Sgt. W. A. Strachan; P/O. R. G. Sutherland; Sgt. G. H. Tett; Sgt. W. F. Towlson; Sgt. T. H. Wood.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—P/O. A. Williams.

MISSING.—Sqn. Ldr. W. A. Anderson; P/O. L. N. Sarles; Sgt. H. V. Spicer.

KILLED ON ACTIVE SERVICE.—Sgt. J. A. Ara; Sgt. I. Mackenzie; P/O. W. E. Madden.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. C. Nuttall; Sgt. C. M. Thompson.

KILLED ON ACTIVE SERVICE.—Sgt. W. D. A. McLeod.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. H. W. Woodham.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. F. Reece.